Firestone-Albany
5.9

DECLARATION
of the
RECORD OF DECISION

SITE NAME AND LOCATION

Firestone Tire & Rubber Company Site
Albany, Dougherty County, Georgia

STATEMENT OF BASIS AND PURPOSE

This decision document(Record of Decision), represents the selected remedial action for the Firestone Tire & Rubber Company "Site", Albany, Dougherty County, Georgia, developed in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization act of 1986 (SARA) 42 U.S.C. Section 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300.

This decision is based on the administrative record for the Site.

The State of Georgia concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare or the environment.

DESCRIPTION OF SELECTED REMEDY

This final remedy addresses remediation of soils and groundwater contamination by eliminating or reducing the risks posed by the Site, through treatment, engineering and institutional controls.

The major components of the selected remedy include:

Excavation of PCB-contaminated soils until established cleanup levels are reached with disposal in an off-site permitted landfill.

Backfilling the excavated areas with clean fill material.

Extraction and treatment of contaminated groundwater using existing wells and supplemental wells if necessary. The contaminated groundwater will be remediated using on-site air stripping.

Discharge of extracted groundwater after treatment to the Local Waste Water Treatment System (Publicly Owned Treatment Works - POTW).

- Periodic groundwater monitoring will be conducted to assess the effectiveness of the remedy.

Institutional controls will be placed on well construction and water use on the Site.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted at least every five years beginning no later than five years from commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Reviews may be conducted on a more frequent basis as EPA deems necessary.

Patrick M. Tobin   6-24-93

Patrick M. Tobin,
Acting Regional Administrator   DATE

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

FIRESTONE TIRE & RUBBER COMPANY SITE
ALBANY, GEORGIA

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

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Decision Summary
Record of Decision

Firestone Tire & Rubber Company Site
Albany, Georgia

1.0 SITE LOCATION AND DESCRIPTION

The Firestone Tire & Rubber Company Site("Site") is located at 3300 Sylvester Road in Albany, Dougherty County, Georgia. The City of Albany is located in Dougherty County in the southwest portion of Georgia. The Site is located approximately one mile east of Albany city limits (Figure 1-1). The Firestone facility was used for manufacturing tires from 1968 to 1986 within a 1,840,000 ft^2 on-site building. In October 1989, the facility was placed on the National Priorities List ("NPL") as a result of environmental investigations conducted at the Site. Except for cleanup activities, the Site remained inactive between 1986 and March 1990, at which time Cooper Tire purchased the facility and began renovations for future operations.

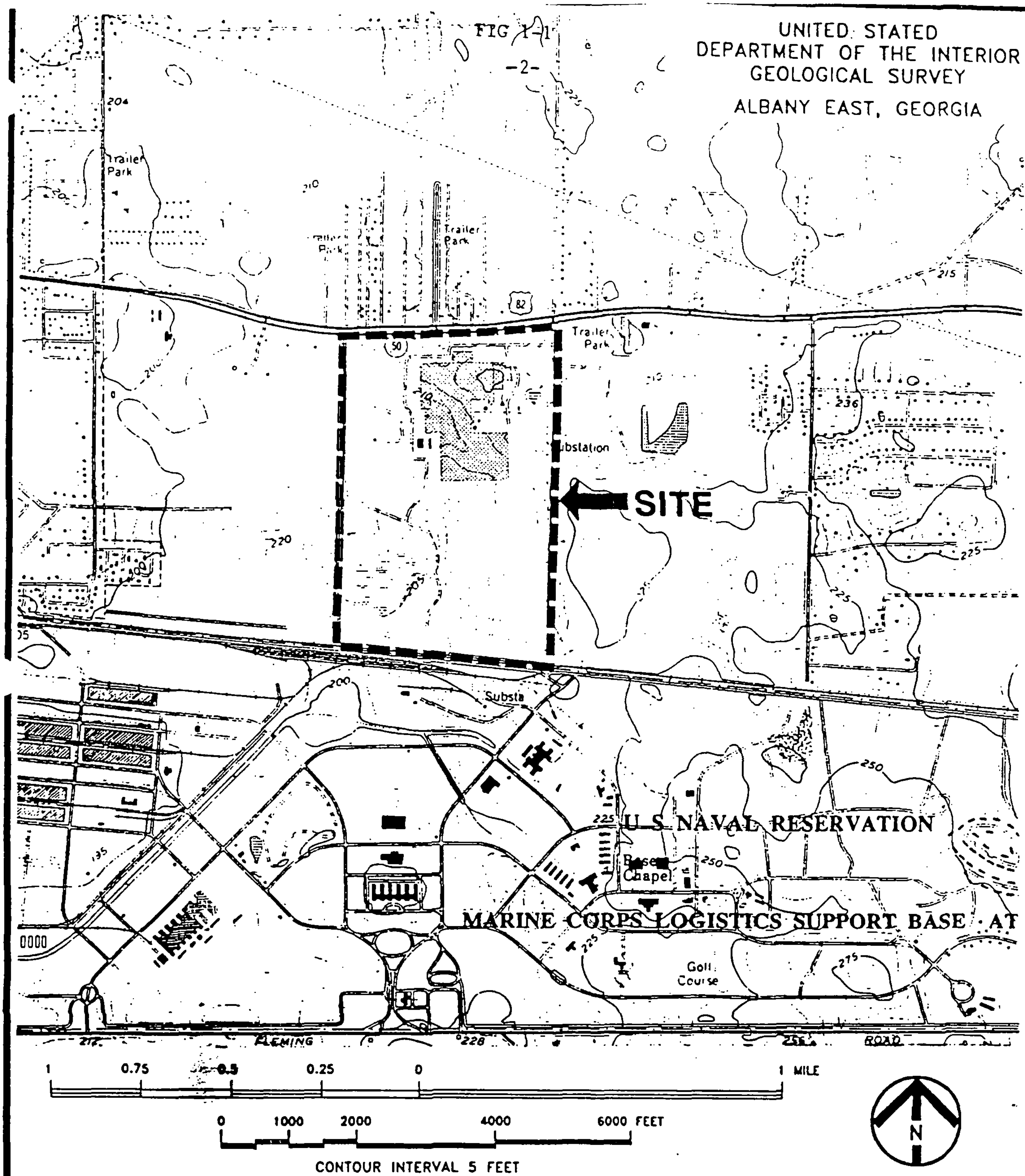
Along the eastern property line of the Site lies vacant land, which was formerly used for agricultural purposes. Immediately to the north of the Site is Sylvester Road, a four-lane highway (U.S. Route 82). North of Sylvester Road are eight mobile home parks and three commercial retail sites, including a flea market and a gas station. Along the western property line are a church, a tree farm and vacant land. The southern property line lies along the Seaboard Coastline railroad tracks. A railroad spur along the east side of the Site, which served the facility's shipping and receiving operations, is connected to the Seaboard Coastline railroad at the southeast corner of the Site. To the south of the Site, beyond the railroad right-of-way, lies the U.S. Marine Corps Logistics Base which has also been identified as a Superfund Site.

The facility is currently zoned as an industrial/commercial area, according to the Dougherty County Planning Commission. The primary source Area of Contamination addressed in this Record of Decision ("ROD") is located in the courtyard area (Figure 1-2). However, certain chemicals have been dispersed throughout the Site.

1.2 SURFACE FEATURES

The Firestone Site is located in the Dougherty Plain district of the Coastal Plain physiographic province. The land displays level or gently undulating topography, with measurements at the Site indicating ground surface elevations ranging from approximately 200 to 220 ft above mean sea level (MSL). The composition of the soils range from well-drained sands to poorly

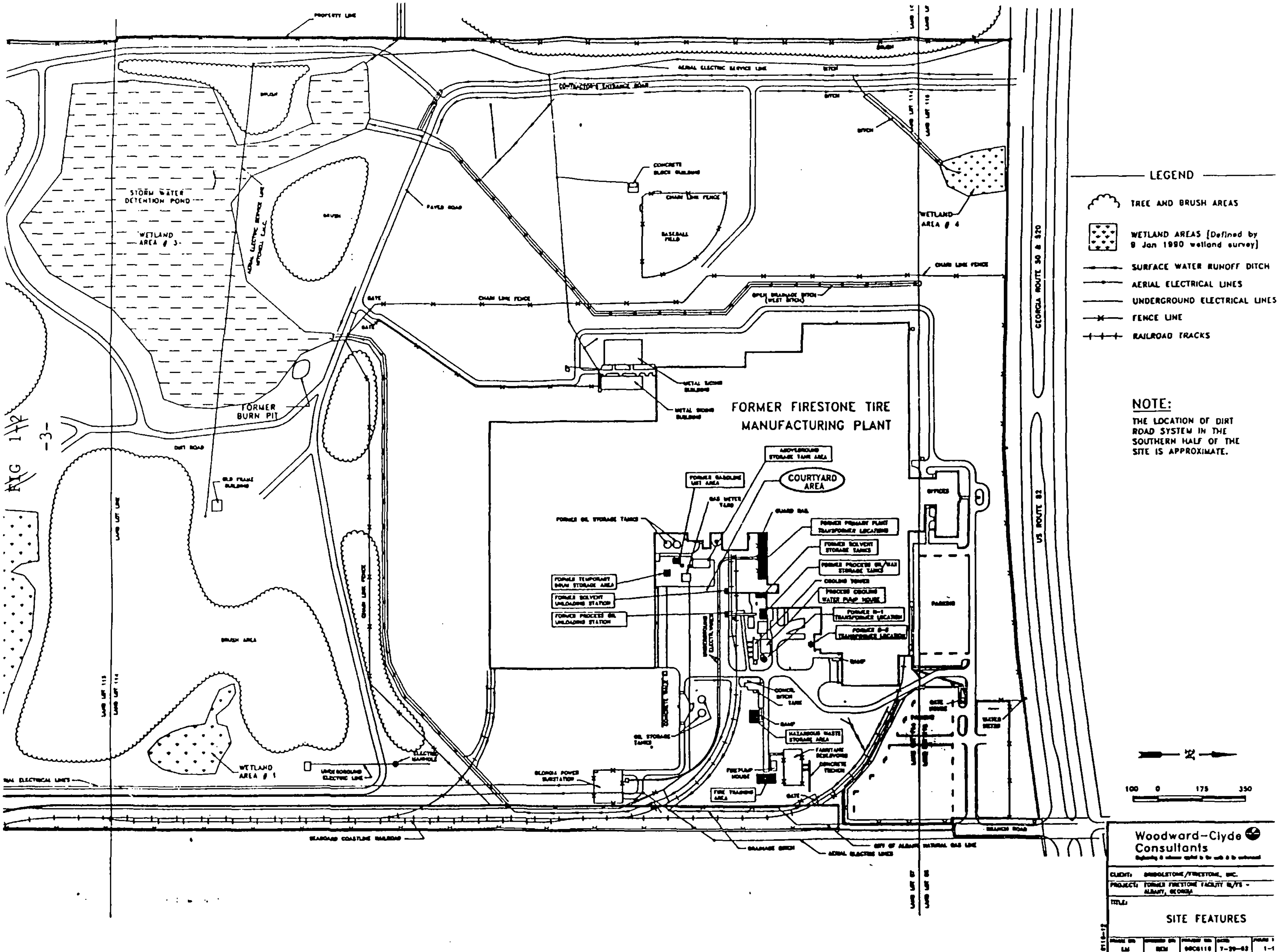
FIG 1-1



GENERAL LOCATION MAP
FORMER FIRESTONE FACILITY - ALBANY, GEORGIA

DRAWN BY: REM	CHECKED BY: MJM	PROJECT NUMBER: 90C6116	DATE: 7-29-92	FIGURE NO: 1-1

Woodward-Clyde Consultants



LEGEND
TREE AND BRUSH AREAS
WETLAND AREAS (Defined by 9 Jan 1990 wetland survey)
SURFACE WATER RUNOFF DITCH
AERIAL ELECTRICAL LINES
UNDERGROUND ELECTRICAL LINES
FENCE LINE
RAILROAD TRACKS
NOTE:
THE LOCATION OF DIRT ROAD SYSTEM IN THE SOUTHERN HALF OF THE SITE IS APPROXIMATE.
FORMER FIRESTONE TIRE MANUFACTURING PLANT
COURTYARD AREA
STORM WATER DETENTION POND
WETLAND AREA # 3
WETLAND AREA # 4
WETLAND AREA # 1
FORMER BURN PIT
GEORGIA ROUTE 30 & 520
US ROUTE 82
100 0 175 350
Woodward-Clyde Consultants
SITE FEATURES
FIG 1-2
-3-

drained soils in ponded depressional areas. Most of the surface soils at the Site are either sandy loams or loamy sands.

The Dougherty Plain is characterized by Karst topography and contains numerous shallow flat-bottomed or rounded sinkholes caused by solutioning and collapse of the underlying limestone. Many of the sinkholes are filled with material of relatively low permeability and some hold water year round. At the Site, the storm water detention pond is a natural pond delineated as Wetland Area No. 3, and is likely to be the surface expression of a sinkhole (Figure 1-2).

1.3 CLIMATE AND METEOROLOGY

Southern Georgia has a warm temperate humid climate due to its latitude and proximity to the Atlantic Ocean and the Gulf of Mexico. The mean total annual precipitation for Albany is about 50 in. The annual mean monthly temperature is about 66°F with mean daily minimum temperatures ranging from approximately 37°F in January to 71°F in July and mean daily maximum temperatures ranging from approximately 60°F in January to approximately 92°F in July and August.

According to data obtained from the National Climate Data Center, no predominant wind direction exists in the Albany area. Winds in the area are calm approximately 23 percent of the time.

1.4 SURFACE WATER HYDROLOGY

The Firestone Site can be characterized as containing both well-drained areas and poorly-drained areas. The well-drained areas include the manufacturing plant area, where roof and parking lot drains discharge storm water directly into ditches, and other areas where the slope is significant to control surface water runoff. Poorly drained areas include some of the wetland areas on the Site.

The ditches and ponds have been observed to completely dry up during periods without precipitation, therefore the surface water hydrology at the Site is influenced mainly by storm events. After a significant storm event, rain falling onto the north half of the Site infiltrates into the ground and/or collects in two main ditches: the East Ditch and the West Ditch. The East and West Ditches also receive storm water from areas north, east and west of the Site. These off-site areas include Sylvester Road and nearby residential/ commercial areas. These ditches flow from north to south and empty into a storm water detention pond (Wetland Area No. 3). The water then flows through the pond to the only outlet located at the west end of the pond. From the pond, the storm water flows through underground storm water pipes, ditches and canals and ultimately discharges to the Flint River. The Flint River converges with the Apalachicola River, which discharges to the Gulf of Mexico.

Rain falling on the southern half of the Site basically flows to one of several wetland areas present in the south. The railroad bed of the Seaboard Coastal Railroad acts as a barrier for surface water entering or leaving the Site from the south. The bed is elevated above normal ground surface and two drainage ditches parallel each side of the railroad bed. Figure 1-2 shows the surface water hydrology of the Site.

1.5 GEOLOGY

The Firestone Site is underlain by Coastal Plain sedimentary strata of pre-Cretaceous to Quaternary age. In general, the strata consist of alternating units of sand, clay, sandstone, dolomite, and limestone that dip gently and thicken in a southeastern direction. The site specific geologic units of interest consist of the Residuum, the Upper Ocala Limestone, and the Lower Ocala Limestone.

The lithology of the Residuum varies across the Site, but can generally be described as sandy clay to clayey sand. Colors also vary and have been identified to include red, brown, yellow, gray, purple, and white. The base of the Residuum unit gradates into the underlying Ocala Limestone and a distinct contact is not present between the two formations. Varying quantities of clay and weathered limestone fragments with traces of dolomitic rocks have been identified near the base of the Residuum.

The Residuum is underlain by the Ocala Limestone which is typically white to tan and grades from a highly weathered, fine to coarse grained, fossiliferous, soft limestone into a less weathered, finer grained, less fossiliferous, more indurated limestone at depths ranging from approximately 130 to 150 ft bgs. The soft, more weathered limestone is referred to as the Upper Ocala and the more indurated limestone is considered to represent the Lower Ocala.

The contact between the Residuum and the Upper Ocala, often described as the Transition Zone, is usually very weathered. Relatively significant void spaces (4 to 10 ft thick) have been identified in the Lower Ocala just below the contact with the Upper Ocala. These void spaces are underlain by a clay filled layer, which is typical of Karst features. The clays are considered to restrict the downward flow of water and subsequently create solution cavities.

1.6 HYDROGEOLOGY

Aquifer Testing Program

An Aquifer Test Program consisting of three separate tests was performed in the Floridan Aquifer by Firestone as a part of the Remedial Investigation/Feasibility Study ("RI/FS"). Specifically, the tests were performed in the Ocala Limestone and overlying Residuum which comprise the Upper Floridan Aquifer at the Site. These test were intended to characterize the conditions and properties of the formations and are listed as:

(1) Single borehole (double-packer) test;
(2) Multi-well aquifer test; and
(3) Production well monitoring tests.

The purpose of the Aquifer Testing Program was to evaluate the hydrogeologic properties of the Ocala Formation and overlying Residuum and to assess the hydraulic connection between the Residuum, Upper and Lower Ocala Formations.

The objectives of the Aquifer Testing Program were to:

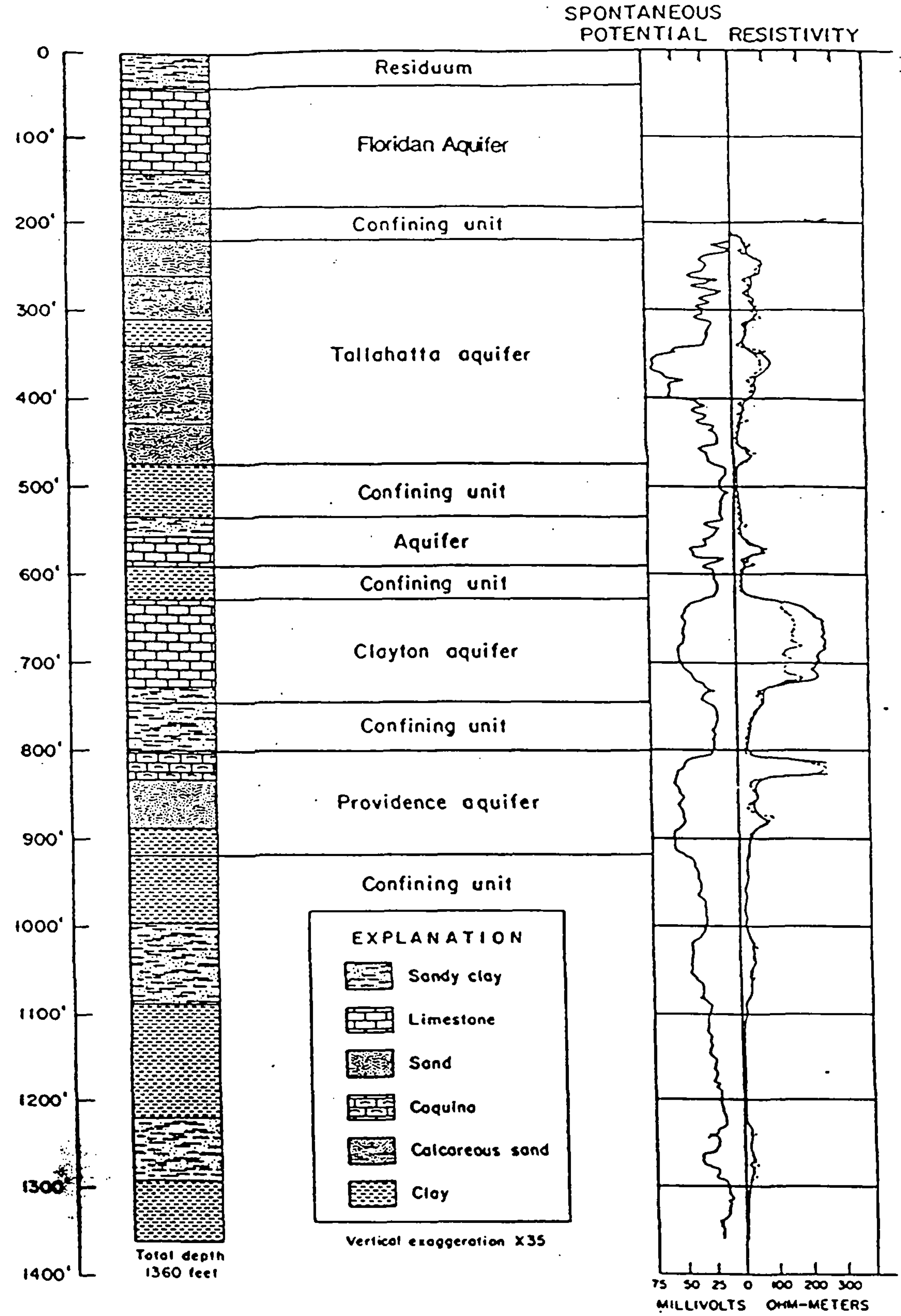
* Gather additional data to assess the rate and direction of groundwater flow in the water-bearing zones underlying the Site,

* Investigate the hydrological continuity between the permeable zones of the Ocala Formation and the overlying water-bearing zones of Residuum; and

* Gather additional data on the hydrogeologic properties (hydraulic conductivity, transmissivity, and yield) of the Ocala Formation underneath the Site.

The Aquifer Testing Program results were also used to evaluate the groundwater flow velocity and chemical migration, and to assess potential groundwater remedial alternatives during the Feasibility Study.

The two hydrogeologic water bearing units of interest at the Site consist of the Residuum and the underlying Floridian Aquifer, and have been referred to as the Residuum, Transition Zone, Upper and Lower Ocala Limestone at the Firestone Site (Figure 1-3). Hydrogeologic characterization was performed at the Site through evaluation of data generated from monitoring well installation in both units and aquifer testing performed in the Ocala Limestone. Groundwater elevation measurements were used to assess the



SOURCE: GEOHYDROLOGY OF THE ALBANY AREA, GEORGIA: HICKS, KRAUSE, AND CLARK, 1981

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

CLIENT: BRIDGESTONE/FIRESTONE, INC.

PROJECT: FORMER FIRESTONE FACILITY RI/FS – ALBANY, GEORGIA

TITLE: REGIONAL HYDROSTRATIGRAPHIC UNITS

DRAWN BY:	CHECKED BY:	PROJECT NO:	DATE:	FIGURE NO:
LH	TJT	90C6116	30 JAN 92	

6116-117

groundwater flow trends and gradients beneath the Site. The aquifer testing was performed to determine the hydraulic properties of the Ocala Limestone in the vicinity of the courtyard.

The uppermost hydrostratigraphic unit is the Residuum. Water-saturated zones have not been encountered in the Residuum at the Site which indicates that the Residuum is not continuously saturated and the groundwater is confined in isolated permeable zones. The horizontal hydraulic conductivity was determined to have an average rate of $4x10^{-5}$cm/sec. The Residuum has been observed to possess strong downward vertical gradients with a rate ranging from approximately 0.7 to 1.9 ft/ft. It is likely that the strong vertical gradients are due to the unsaturated nature of the Residuum, continuous drainage and recharge of isolated zones, and regional downward flow components. Horizontal movement of groundwater within the Residuum is limited by the lack of continuous water-bearing zones and low horizontal hydraulic conductivity.

It was found that there is hydraulic heterogeneity in the Upper Ocala with calculated hydraulic conductivity values in the vicinity of $1x10^{-5}$cm/sec. The relatively low hydraulic conductivity of the Upper Ocala verifies its classification as a regional semi-confining unit for the Lower Ocala. The vertical gradients measured in the Upper Ocala across the Site were fairly constant and average 0.06 ft/ft. This information suggests that the downward movement of groundwater within the Upper Ocala is a result of regional stresses and natural recharge-discharge relationships. The average horizontal gradient was found to be approximately 0.002 ft/ft. The horizontal groundwater flow directions are somewhat variable; southwest-west flow directions are evident in the northeast corner of the Site, but are reversed in the southwest corner. Local variations in groundwater flow directions that are not consistent with regional directions are common in the upper portions of the Ocala. Undulations and depressions that have been identified at the bedrock surface of the Ocala, localized permeability changes, and water table mounding in the vicinity of the storm water detention pond may influence the groundwater flow patterns in the Upper Ocala at the Site.

The hydraulic conductivity of the Lower Ocala is estimated to be on the order of $3x10^{-1}$ cm/sec. This estimate is consistent with published literature describing prolific zones and potable water supplies within the lower portions of Ocala Limestone and is considerably greater than the range established for the overlying weathered materials characteristic of the Upper Ocala. The increased conductivity may be attributed to fracturing and more extensive dissolution in the Lower Ocala. The primary component of flow is horizontal with gradient of approximately 0.001 ft/ft for the southwest portion of the Site. A relatively flat potentiometric surface has been identified across the remainder of the Site.

Recharge to the Residuum and the Ocala Limestone is primarily by infiltration of precipitation and flows vertically downward. The Residuum is leaky and provides recharge to the underlying Upper Ocala but at a limited rate. Horizontal movement in the Residuum is limited by the lack of continuous water bearing zones and low hydraulic conductivity.

1.7 DEMOGRAPHY

There are eight residential mobile home parks located directly north of the Site. Reportedly, there are a total of 250 units within these parks. Approximately, 956 people live directly north of the Site in Census Block 207 which includes, but is not limited to, these trailer parks. Additionally, within one mile of the Site, 70 people live north of Census Block 207. A large flea market is also located directly north of the Site which is open to the general public on Friday through Sunday.

Approximately 735 people live west of the Site and south of Sylvester Road within a one mile radius of the Site and approximately 340 people live west of Pine Bluff Road within one mile radius northwest of the Site.

Another residential area, north of Sylvester Road, is located approximately three miles east of the Site. There are approximately 140 residents in this area according to the 1990 Census. A mobile home park is located approximately one mile east of the Site, on Sylvester Road. According to the 1990 Census, 27 people live in ten housing units within this mobile home park. Commercial businesses east of the Site on Sylvester Road include two transportation and distribution companies. There is also a residential area less that a mile east of the Site. According to the 1990 Census, there are approximately 600 residents that live within this area.

The seaboard Coastline Railroad separates the Site from the U.S. Marine Corps Logistics Base which is the largest industrial and residential complex located south of the Site. The Base employs approximately 2,700 civilians and provides housing for approximately 600 Marine families.

Sylvester Road Elementary School (408 students) is located approximately one mile west of the Site. In addition, two more elementary schools (1,145 students), a middle school (951 students), and a high school (1,034 students) are located approximately three miles west of the Site.

The Albany city hospital is located west of the Flint River more than three miles from the Site.

1.8 ECOLOGY

There are two distinct vegetation zones at the Site: a grassy area located on the northern half of the Site, and a wooded and wetland area located on the southern half of the Site.

The main grassy area that lies within the fenced area of the manufacturing plant and on the northern half of the Site is periodically mowed and predominantly contains Bahia grass. Some commonly occurring hydrophytic vegetation scattered throughout other grassy areas include reed grass, vasey grass, maidencane, sedges, rushes and mild water pepper.

The southern half of the Site consists of a mixed southern pine/hardwood forest and large wetland areas. The upland areas of the pine/hardwood forest consist mostly of young slash pine and live oak. Some sections of the upland area are barren or covered only with herbaceous plants including golden aster, honeysuckle, black raspberry and goldenrods. The wetland areas of the southern half contain such species as black willow, water oak, southern bayberry and cattail.

The fauna on and around the Site observed in August 1991 include, but is not limited to, mammals such as the white-tailed deer, raccoon, gray fox, gray squirrel and eastern cottontail rabbit; birds such as the common crow, mourning dove, bobwhite quail, turkeyvulture, killdeer, cattle egret, blue jay and mockingbird; reptiles such as the gopher tortoise; amphibians such as the green frog; and pond macro-invertebrates such as water boatmen, water striders and dragonflies.

Four rare species believed to inhabit Dougherty County by the Georgia Department of Natural Resources were not observed at the Site: the spotted bullhead, bluestripe shiner, hooded pitcher plant, and chafseed. However, the gopher tortoise, believed to be rare in some parts of southwestern Georgia, was spotted on the Site.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site is owned by the Albany-Dougherty Payroll Developement Authority. Under lease, the sole use of this Site by the former Firestone Tire & Rubber Company was the manufacture of pneumatic tires. Bridgestone/Firestone, Inc.("Bridgestone/Firestone") is the successor to Firestone Tire & Rubber Company (The names are used interchangeably throughout this ROD). Manufacturing at the facility was carried out from 1968 to 1986 within a 1,840,000 ft^2

building. Construction of the complex commenced in 1967 and several additions were built over the years. Bridgestone/Firestone, Inc. ceased operations at the Site in 1986. The Site was proposed for the NPL in June of 1988 and was finally included in October of 1989. EPA issued a Special Notice Letter to Bridgestone/Firestone in March of 1990, giving them an opportunity to conduct the RI/FS at the Site. The company entered into an Administrative Order on Consent (AOC) with EPA in 1990 to study the Site further and to evaluate possible actions to address any contamination found. Except for remedial activities discussed below, the Site remained inactive until March 1990, at which time Cooper Tire Company purchased the Bridgestone/Firestone, Inc. leasehold and began renovations for future operations.

In 1985, Bridgestone/Firestone, Inc., as a part of facility closure voluntarily initiated a study of possible contamination in soil, groundwater, and surface water. Based on the results of this assessment, a scope of work for further studies was defined. The study identified the courtyard and the burn pit as two major Areas of Contamination (AOCs). These areas are presented on Figure 1-2.

The area referred to as the courtyard is located on the eastern side of the plant and is enclosed by the manufacturing buildings on three sides. The courtyard was designed for shipping and material handling operations. Materials used in the manufacturing processes and general facility operations were delivered to the courtyard by both rail and roadway. Underground storage tanks, which were removed in interim cleanup actions in 1986, were formerly located in two areas of the courtyard. Transformers mounted on concrete pads were located in the Courtyard. Four above-ground fuel oil storage tanks remain on-site.

The second area of concern, the burn pit area, covers about 3,000 square feet near the intersection of the east drainage ditch and the storm water retention pond. The burn pit seems to have been built to collect runoff from a 6,000 gallon spill of anti-oxidant (Santoflex 13) in 1980. The fluid was later pumped into 55-gallon drums and stored adjacent to the pit. Later in 1980 this material and 65 partially rifled drums of liquid waste cement were burned as a fire training exercise.

Bridgestone/Firestone, Inc. took a series of interim cleanup measures, including additional groundwater monitoring to better define concerns identified in the 1985 study. The company presented descriptions of their past investigations to EPA in a Scoping Document submitted on October 7, 1990 as a preliminary remedial investigation report under the Administrative Order.

The cleanup actions and studies which Firestone conducted at the

Site consisted mainly of the following activities:

* Identified and analyzed soil and debris piles, and removed and disposed contaminated materials. Approximately 441 cubic yards (c.y.) of rubbish and debris and 105 c.y. of soil were taken to the Oxford Solid Waste Landfill in Albany during these general cleanup activities). Empty 5-gallon containers and a few 55-gallon drums were disposed at a regulated facility in Alabama.

* Studied PCB transformer leaks in interior of building, on the building, and in the courtyard; removed transformers, roof materials, and concrete pads; cleaned up areas surrounding former transformers and placed in a permitted facility.

* Installed monitoring wells in surficial aquifer and Upper Floridan Aquifer and collected soil samples in the courtyard to determine if the source area of the contamination would affect groundwater.

* Removed underground storage tanks (USTs).

* Studied burn pit/buried drum area, excavated the burn pit; removed and disposed of approximately 160 drums, which contained material similar to waste rubber cement and Banbury Sludge (material used to make tires/all material passed TCLP test), and contaminated soil and water; and collected samples to determine the adequacy of the cleanup.

* Identified areas of potential subsurface drum disposal which were evaluated by a magnetic survey, but no additional buried drums or waste material were identified.

* Sampled surface water and sediments in the storm water retention pond and drainage ditches flowing into the pond.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public participation requirements in CERCLA Section 117 were met in the remedy selection process. The Community Relations Plan was finalized in 1991 for the Firestone Tire and Rubber Superfund Site. This document list contacts and interested parties throughout the government and the local community. The plan also establishes communication pathways to assure timely dissemination of pertinent information.

On August 1, 1991, EPA held a public information session to announce the start of the Firestone Site RI/FS. The RI/FS Workplan, Risk Assessment, Technical Memorandums, RI/FS Reports, Proposed Plan and any other documents EPA used to prepare a preferred remedy were released to the public on December 30, 1992. The documents were made available to the public in both the administrative record docket and the information repository maintained at the EPA docket room at Region IV Headquarters in Atlanta, Georgia and at the Dougherty Public Library, 300 Pine Avenue in Albany, Georgia. A public comment period was held from December 30, 1992 to January 29, 1993.

Notices were placed in the Albany Herald newspaper on December 28, 1992, January 5 and 11, 1993 announcing the comment period. In addition to the public comment period and the administrative record files, a public meeting was held on January 12, 1993 at the Albany City Hall. At this meeting representatives from EPA and Georgia Enviromental Protection Division answered questions and addressed community concerns.

A response to all significant comments received during the public comment periods is included in the Responsiveness Summary (Appendix A), which is a part of this Record of Decision.

This decision document presents the selected remedial action for the Firestone Tire and Rubber Site, chosen in accordance with CERCLA, as amended by SARA and to the maximum extent practicable, the NCP. The decision for this Site is based on the administrative record. The requirements under Section 117 of CERCLA/SARA for public and state participation have been met for this remedy selection.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses contamination remaining in approximately 20 cubic yards of PCB contaminated soil and Volatile Organic Compounds (VOCs) in shallow groundwater (Residuum, Transition Zone and Upper Ocala) beneath the Firestone Site. The contaminated soils pose a threat to human health and the environment from possible ingestion (eating or drinking), inhalation (breathing) or dermal contact (through the skin). Also, the groundwater could pose a threat if it were to migrate off-site or be used as a water source in the future. The purpose of the selected remedy is to prevent current and future exposure to the contamination by treating the soil and groundwater to reduce movement of contaminants. This is the only ROD contemplated for the Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 Nature and Extent of Contamination

The following section provides a description of the nature and extent of the contamination found in each media during the RI.

5.1.1. Confirmatory Sampling of the Former Interior PCB Transformer Locations

A total of 10 floor wipe samples were collected from interior transformer locations to verify that previous remedial activities had achieved the PCB target cleanup level of 10 ug/cm^2. The samples were collected in accordance with the FSAP and analyzed for PCBs. Sample results indicated that PCB concentrations for all areas were below detection limits.

5.1.2 Groundwater Sampling

A total of 17 groundwater wells and one piezometer were installed at depths ranging from 32-190 ft. A total of 46 groundwater samples were collected from the monitoring wells located throughout the Site, between August 14, through October 3, (Phase I), and December 9, through December 12 (Phase II), 1991. In addition to the groundwater samples, 9 duplicates, 4 matrix spikes and matrix spike duplicates (MS/MSD), 27 field blanks, 22 trip blanks and 2 equipment rinsate samples were collected as per FSAP and Quality Assurance Project Plan (QAPP). All of the groundwater samples were analyzed for the Contract Laboratory Program's (CLP) Target Compound List/Target Analyte List (TCL/TAL) parameters. Contaminants found in the groundwater at concentrations that exceed a Hazard Quotient of 1 or an upper bound cancer Risk of $1x10^{-6}$ include Antimony, Carbon-Disulfide, 1,1-Dichloroethene Beryllium, Benzene, 1,1,1-Trichloroethane, PCBs Lead,Chromium and Bis (2-Ethylhexyl) phthalate (DEHP). Groundwater sampling locations are provided in Figure 5-1. Figures 5-2 thru 5-4 provide the monitoring well locations screened in the contaminated aquifers and indicator contaminants identified during the RI activities. A summary of the contaminants detected during groundwater sampling activities is presented in Table 5-1.

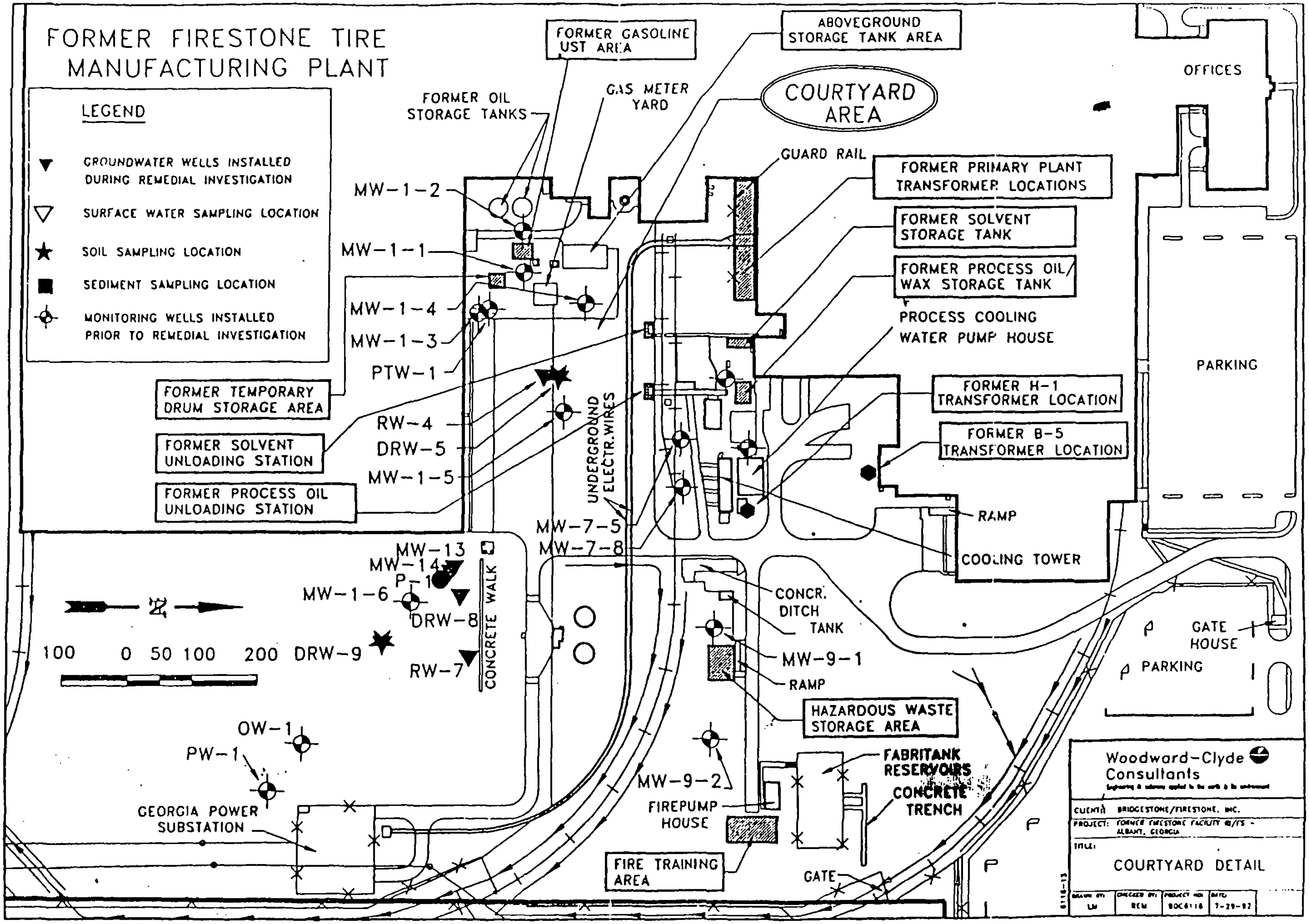
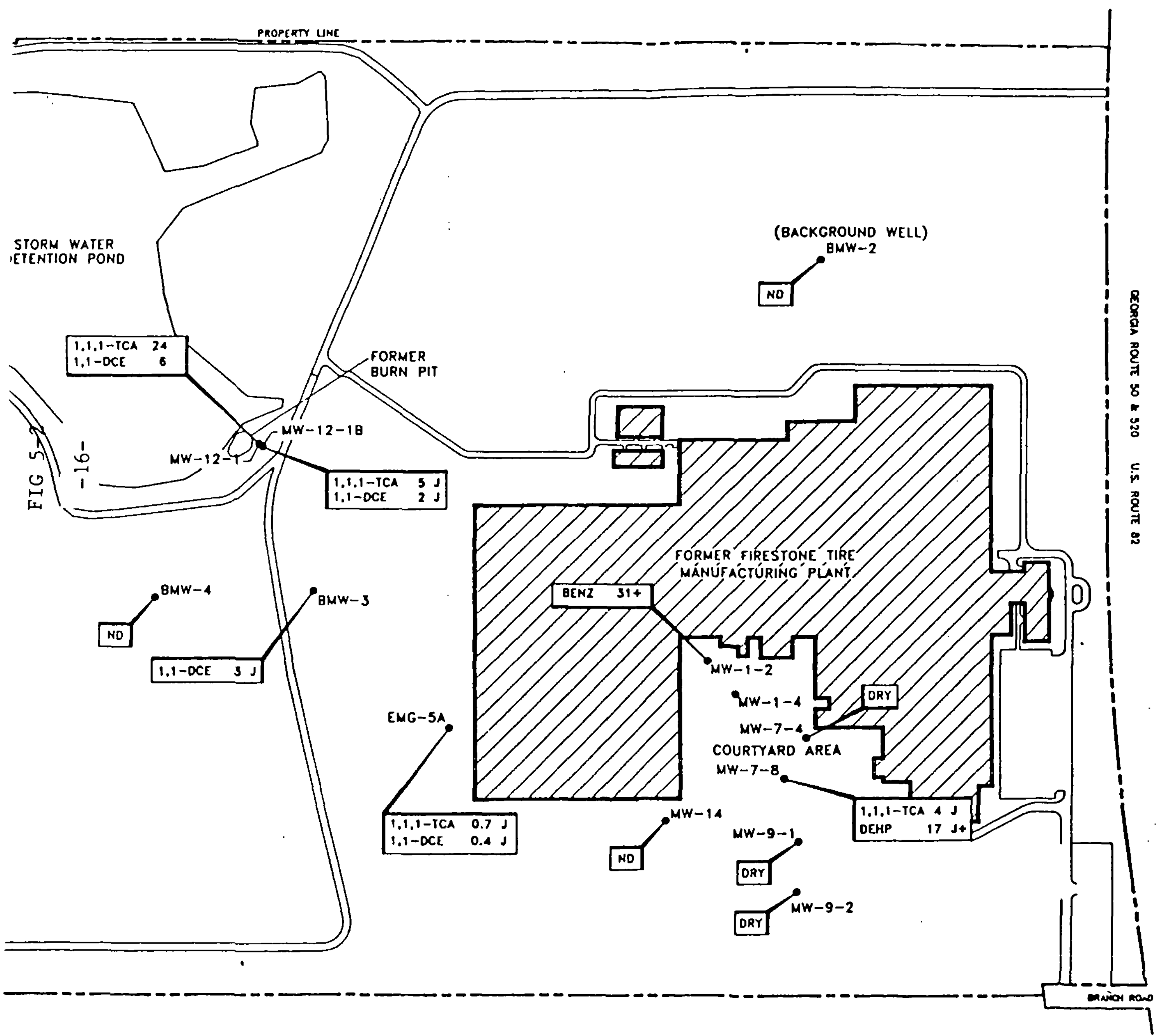

FORMER FIRESTONE TIRE MANUFACTURING PLANT
LEGEND
GROUNDWATER WELLS INSTALLED DURING REMEDIAL INVESTIGATION
SURFACE WATER SAMPLING LOCATION
SOIL SAMPLING LOCATION
SEDIMENT SAMPLING LOCATION
MONITORING WELLS INSTALLED PRIOR TO REMEDIAL INVESTIGATION
FORMER OIL STORAGE TANKS
FORMER GASOLINE UST AREA
GAS METER YARD
ABOVEGROUND STORAGE TANK AREA
COURTYARD AREA
OFFICES
GUARD RAIL
FORMER PRIMARY PLANT TRANSFORMER LOCATIONS
FORMER SOLVENT STORAGE TANK
FORMER PROCESS OIL/WAX STORAGE TANK
PROCESS COOLING WATER PUMP HOUSE
PARKING
FORMER H-1 TRANSFORMER LOCATION
FORMER B-5 TRANSFORMER LOCATION
RAMP
COOLING TOWER
MW-1-2
MW-1-1
MW-1-4
MW-1-3
PTW-1
FORMER TEMPORARY DRUM STORAGE AREA
FORMER SOLVENT UNLOADING STATION
FORMER PROCESS OIL UNLOADING STATION
RW-4
DRW-5
MW-1-5
UNDERGROUND ELECTR. WIRES
MW-7-5
MW-7-8
MW-13
MW-14
P-1
MW-1-6
DRW-8
DRW-9
RW-7
CONCRETE WALK
100 0 50 100 200
CONCR. DITCH
TANK
MW-9-1
RAMP
HAZARDOUS WASTE STORAGE AREA
GATE HOUSE
PARKING
OW-1
PW-1
GEORGIA POWER SUBSTATION
MW-9-2
FIREPUMP HOUSE
FABRITANK RESERVOIRS
CONCRETE TRENCH
FIRE TRAINING AREA
GATE
Woodward-Clyde Consultants
CLIENT: BRIDGESTONE/FIRESTONE, INC.
PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA
TITLE: COURTYARD DETAIL
REM
90C6116
7-29-92

FIG 5-1

FIG 5-2

-16-



LEGEND

- ● RESIDUUM WELL
- 9 ANALYTICAL RESULTS REPORTED IN ug/l
- ND CHEMICALS NOT DETECTED
- + CONCENTRATION EXCEEDS REMEDIATION GOALS

CHEMICALS IDENTIFIED

1,1,1-TCA	1,1,1-TRICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHYLENE
BENZ	BENZENE
DEHP	DI (2-ETHYLHEXYL) PHTHALATE

J = THE VALUE IS AN ESTIMATED CONCENTRATION. OFTEN APPLIED WHEN THE CHEMICAL IS DETECTED BETWEEN THE CONTRACT-REQUIRED DETECTION LIMIT (CDRL) AND THE INSTRUMENT DETECTION LIMIT (IDL)

N

0 200 400 800

SCALE FEET

Woodward-Clyde Consultants

Engineering & sciences applied to the earth & its environment

CLIENT: BRIDGESTONE/FIRESTONE, INC.

PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA

TITLE: ANALYTICAL RESULTS FOR CHEMICALS TO BE REMEDIATED IN RESIDUUM WELLS

DRAWN BY: | CHECKED BY: | PROJECT NO: | DATE:

118-31C

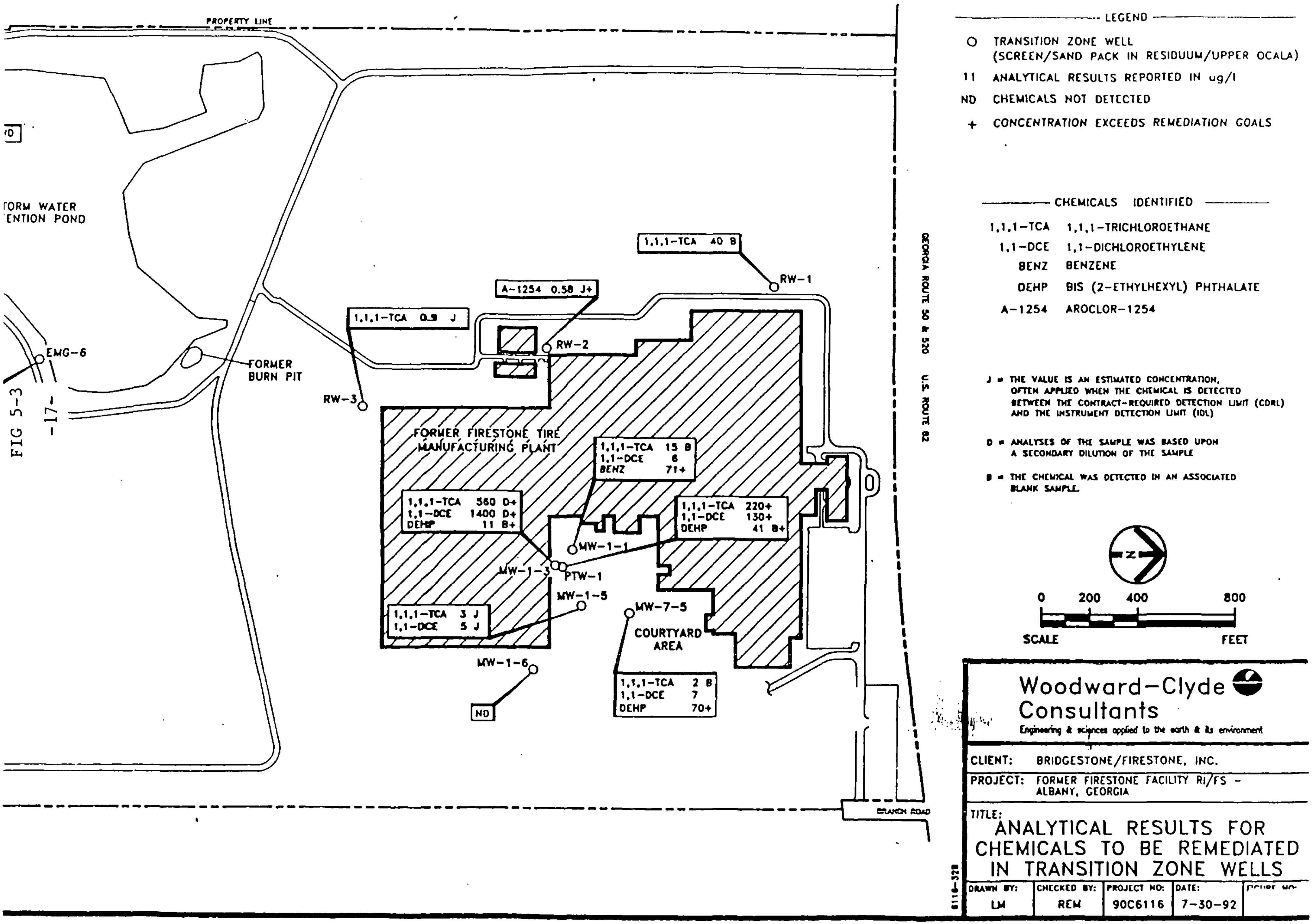
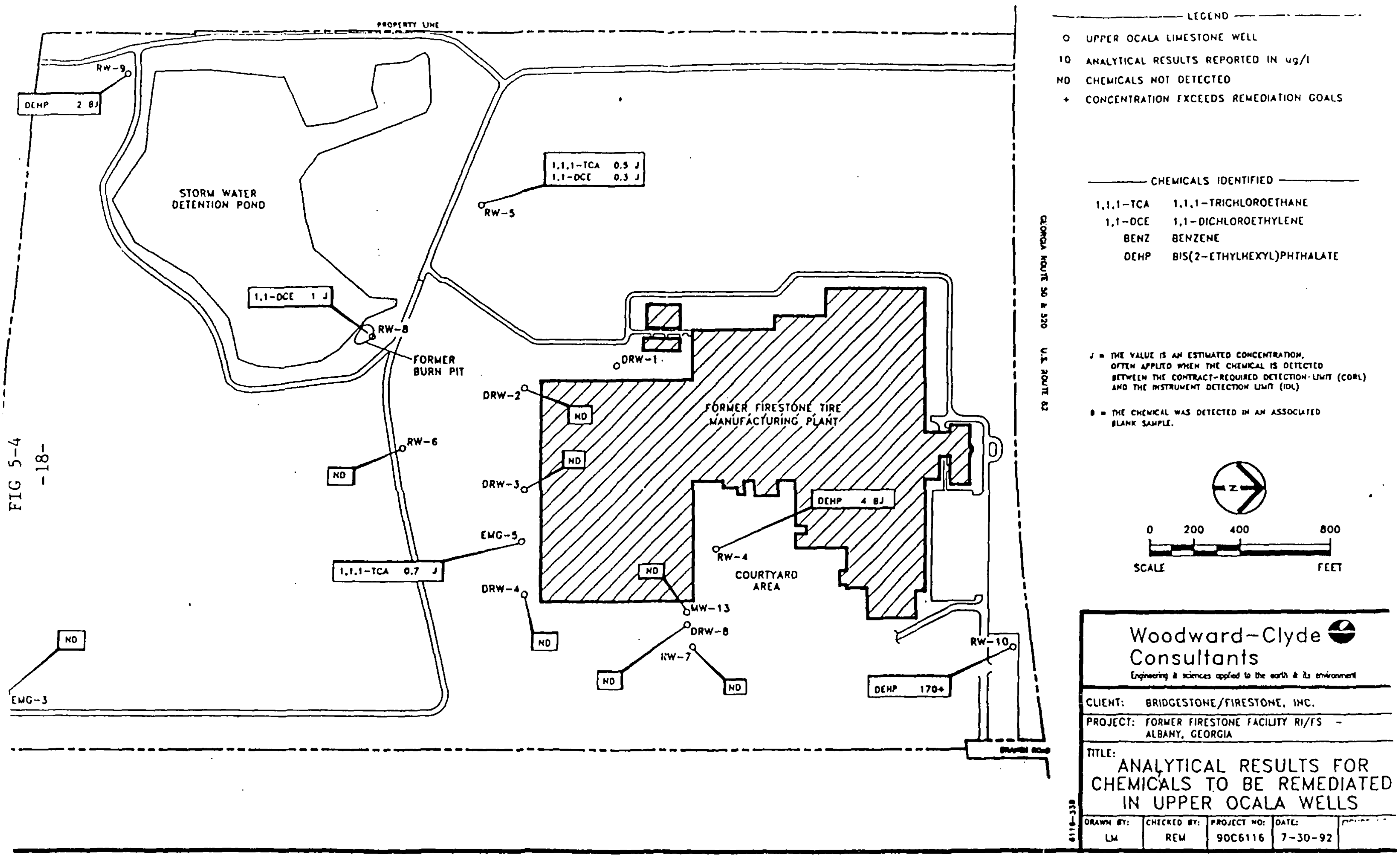

PROPERTY LINE
STORM WATER
RETENTION POND
EMG-6
FORMER
BURN PIT
RW-3
1,1,1-TCA 0.9 J
A-1254 0.58 J+
RW-2
1,1,1-TCA 40 B
RW-1
FORMER FIRESTONE TIRE
MANUFACTURING PLANT
1,1,1-TCA 15 B
1,1-DCE 6
BENZ 71+
1,1,1-TCA 560 D+
1,1-DCE 1400 D+
DEHP 11 B+
1,1,1-TCA 220+
1,1-DCE 130+
DEHP 41 B+
MW-1-1
MW-1-3
PTW-1
MW-1-5
MW-7-5
COURTYARD
AREA
1,1,1-TCA 3 J
1,1-DCE 5 J
MW-1-6
ND
1,1,1-TCA 2 B
1,1-DCE 7
DEHP 70+
GEORGIA ROUTE 50 & 520
U.S. ROUTE 82
BRANCH ROAD
FIG 5-3
-17-
LEGEND
TRANSITION ZONE WELL
(SCREEN/SAND PACK IN RESIDUUM/UPPER OCALA)
11 ANALYTICAL RESULTS REPORTED IN ug/l
ND CHEMICALS NOT DETECTED
+ CONCENTRATION EXCEEDS REMEDIATION GOALS
CHEMICALS IDENTIFIED
1,1,1-TCA 1,1,1-TRICHLOROETHANE
1,1-DCE 1,1-DICHLOROETHYLENE
BENZ BENZENE
DEHP BIS (2-ETHYLHEXYL) PHTHALATE
A-1254 AROCLOR-1254
J = THE VALUE IS AN ESTIMATED CONCENTRATION, OFTEN APPLIED WHEN THE CHEMICAL IS DETECTED BETWEEN THE CONTRACT-REQUIRED DETECTION LIMIT (CDRL) AND THE INSTRUMENT DETECTION LIMIT (IDL)
D = ANALYSES OF THE SAMPLE WAS BASED UPON A SECONDARY DILUTION OF THE SAMPLE
B = THE CHEMICAL WAS DETECTED IN AN ASSOCIATED BLANK SAMPLE.
N
0 200 400 800
SCALE FEET
Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment
CLIENT: BRIDGESTONE/FIRESTONE, INC.
PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA
TITLE: ANALYTICAL RESULTS FOR CHEMICALS TO BE REMEDIATED IN TRANSITION ZONE WELLS
DRAWN BY: LM
CHECKED BY: REM
PROJECT NO: 90C6116
DATE: 7-30-92
FIGURE NO:
6116-328

FIG 5-4



PROPERTY LINE
LEGEND
O UPPER OCALA LIMESTONE WELL
10 ANALYTICAL RESULTS REPORTED IN ug/l
ND CHEMICALS NOT DETECTED
+ CONCENTRATION EXCEEDS REMEDIATION GOALS
CHEMICALS IDENTIFIED
1,1,1-TCA 1,1,1-TRICHLOROETHANE
1,1-DCE 1,1-DICHLOROETHYLENE
BENZ BENZENE
DEHP BIS(2-ETHYLHEXYL)PHTHALATE
J = THE VALUE IS AN ESTIMATED CONCENTRATION. OFTEN APPLIED WHEN THE CHEMICAL IS DETECTED BETWEEN THE CONTRACT-REQUIRED DETECTION LIMIT (CRDL) AND THE INSTRUMENT DETECTION LIMIT (IDL)
B = THE CHEMICAL WAS DETECTED IN AN ASSOCIATED BLANK SAMPLE.
GEORGIA ROUTE 50 & 520 U.S. ROUTE 82
0 200 400 800
SCALE FEET
STORM WATER DETENTION POND
FORMER BURN PIT
FORMER FIRESTONE TIRE MANUFACTURING PLANT
COURTYARD AREA
RW-9
DEHP 2 BJ
RW-5
1,1,1-TCA 0.5 J
1,1-DCE 0.3 J
RW-8
1,1-DCE 1 J
DRW-1
DRW-2
ND
RW-6
ND
DRW-3
ND
EMG-5
1,1,1-TCA 0.7 J
DRW-4
ND
RW-4
DEHP 4 BJ
MW-13
ND
DRW-8
ND
RW-7
ND
RW-10
DEHP 170+
EMG-3
ND
Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment
CLIENT: BRIDGESTONE/FIRESTONE, INC.
PROJECT: FORMER FIRESTONE FACILITY RI/FS - ALBANY, GEORGIA
TITLE: ANALYTICAL RESULTS FOR CHEMICALS TO BE REMEDIATED IN UPPER OCALA WELLS
DRAWN BY: LM
CHECKED BY: REM
PROJECT NO: 90C6116
DATE: 7-30-92

TABLE 5-1

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTRATIGRAPHIC UNIT

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
1,1,1-Trichloroethane	Yes	Yes	No Not detected	Yes
1,1-Dichloroethane	Yes	Yes	No Detected once	Yes
1,1-Dichloroethylene	Yes	Yes	No Detected once	Yes
Acetone	Yes	Yes	Yes	Yes
Benzene	Yes	Yes	No Not detected	Yes
Bromodichloromethane	No Not detected	No Not detected	No Present in background[4] Detected twice	No
Carbon Disulfide	Yes	Yes	Yes	Yes
Chlorobenzene	No Not detected	No Detected once	No Not detected	No
Chloroform	No Not detected	No Detected once	Yes	Yes
Dibromochloromethane	No Not detected	No Not detected	No Present in background[4] Detected twice	No
Ethylbenzene	No Not detected	Yes	No Not detected	Yes
Methylene Chloride	No Presence in blanks	No Presence in blanks	No Presence in blanks	No

TABLE 5-1 (con't)

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTATIGRAPHIC UNIT (Continued)

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
Tetrachloroethylene	No Not detected	No Not detected	Yes	**Yes**
Toluene	No Not detected	Yes	Yes	**Yes**
Trichloroethylene	No Not detected	No Not detected	Yes	**Yes**
Xylenes	No Not detected	Yes	No Not detected	**Yes**
Benzoic Acid	No Not detected	No Detected once	No Detected twice	No
Bis(2-ethylhexyl)phthalate)	Yes	No Detected once	Yes Detected three times	**Yes**
Phenol	No Not detected	No Not detected	No Detected twice	No
Endosulfan	No Detected once	No Not detected	No Detected once	No
Lindane	No Detected once	No Not detected	No Not detected	No
Aluminum	No Comparable to background	Yes	No Comparable to background	**Yes (see note 1)**
Antimony	Yes	Yes	No Not detected	**Yes (see note 5)**
Arsenic	No Not detected	No Detected once	No Comparable to background	No
Barium	No Comparable to background	No Comparable to background	No Comparable to background	No
Beryllium	Yes	Yes	No Not detected	**Yes (see note 1)**

TABLE 5-1 (con't)

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTATIGRAPHIC UNIT (Continued)

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
Cadmium	No Not detected	Yes	No Not detected	**Yes (see note 1)**
Calcium	No Comparable to background	No Comparable to background	No Comparable to background	No
Chromium	No Comparable to background	Yes	Yes	**Yes (see note 3 and 5)**
Cobalt	No Comparable to background	Yes	No Detected once	**Yes (see note 1)**
Copper	No Comparable to background	Yes	No Comparable to background	**Yes (see note 1)**
Iron	No Comparable to background	Yes	No Comparable to background	**Yes (see note 1)**
Lead	Yes	Yes	Yes	**Yes (see note 1 and 5)**
Magnesium	No Comparable to background	Yes	No Comparable to background	**Yes (see note 1)**
Manganese	No Comparable to background	Yes	No Comparable to background	**Yes (see note 1)**
Mercury	No Comparable to background	No (comparable to background at one-half detection limit)	No Not detected	No
Nickel	Yes	Yes	No Detected once	**Yes (see note 5)**
Potassium	No Comparable to background	No Comparable to background	Yes	No (see note 3)

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN GROUNDWATER IN EACH HYDROSTATIGRAPHIC UNIT (Continued)

Chemical	Residuum	Upper Ocala	Lower Ocala	Evaluated in Risk Assessment?
Selenium	No Comparable to background	No Not detected	No Not detected	No
Silver	No Not detected	No Detected once	No Not detected	No
Sodium	No Trace element	No Comparable to background	No Comparable to background	No
Thallium	Yes	Yes	No Detected twice	**Yes (see note 5)**
Vanadium	No Comparable to background	Yes	No Comparable to background (less than 3x background)	**Yes (see note 1)**
Zinc	No Comparable to background	No Comparable to background	No Comparable to background	No

1. Chemistry from wells drawing water from both the residuum and Upper Ocala formation (transitional wells) were included in the derivation of an average concentration for the Upper Ocala. When compared with the results of the Upper Ocala background well (which does not draw from both units), the average concentration in the Upper Ocala site wells appears to be higher than the background location. However, when these average concentrations are compared with the background concentrations in the residuum, the metal concentrations are comparable. Since concentrations in the residuum and lower Ocala wells are also comparable to background concentrations, it is not clear whether it is appropriate to consider these metals in the baseline risk assessment. However, to be conservative, these metals are considered, and the ramification of that inclusion discussed in the uncertainty assessment.

2. One high concentration (42.5 ug/L) in MW-7-5 has skewed the average concentration to 3.2 ug/L, which may exceed the background concentration of < 4.5 ug/L. The average concentration without this high value is 2.1 ug/L. The geometric mean value with this high value is 1.4 ug/L. The second highest concentration is 8.5 ug/L, then 3.1 ug/L.

3. One high concentration (chromium = 269 ug/L; potassium = 175,000 ug/L) skewed the average for these chemicals, resulting in exceedence of the background concentrations. The average concentration of chromium without this value is 13.5 ug/L (compared with background of 14.5 ug/L); of potassium is 2329 ug/L (average concentration = 6060 ug/L). The geometric mean concentration for chromium and potassium including high values are 12.8 ug/L and 2588 ug/L, respectively.

4. The presence of an organic chemical in a background sample is not a criterion for selection as a contaminant of concern. The fact that an organic chemical is present in a background sample is presented as information only.

5. These (unfiltered) metals, in some instances, are included as COCs because some concentrations detected exceed the metal's MCL. In many cases, the metal is comparable to background concentrations, and in some instances, the background concentration also exceeds the MCL.

5.1.3. Surface Water Sampling

Six surface water samples were collected after storm events to characterize on-site water quality conditions. These six samples were analyzed for TCL/TAL parameters. Four additional surface water samples were collected on December 12, 1991 to compare on-site water quality to state and federal water quality criteria. Three samples were collected from the storm water detention pond and field tested for water hardness. one sample was collected from the East Ditch, located just upstream from the area where development water was discharged. This sample was analyzed for TCL VOCs. No contaminants were found in the surface water at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Surface water sampling locations are provided in Figure 5-1. A summary of the contaminants detected during surface water sampling activities is presented in table 5-4.

5.1.4 Surface Soil Sampling

A total of 22 surface soil samples were collected throughout the Site. The purpose of this sampling effort was to characterize surface soil at the Site and to obtain chemical data for use in the baseline risk assessment. The surface samples were collected in accordance with the Field Sampling and Analysis Plan and were analyzed for all TCL/TAL parameters. No contaminants were found in the surface soil at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Surface soil sampling locations are provided in Figure 5-1. A summary of the contaminants detected during surface soil sampling activities is presented in table 5-2.

5.1.5 Subsurface Soil Sampling

A total of 37 subsurface soil samples were collected at 12 soil boring locations and 6 well cluster locations. The purpose of this soil sampling effort was to develop a more complete soil profile characterization of the Site and to evaluate the potential for contamination to migrate from the soil to the groundwater. The subsurface samples were collected in accordance with the Field Sampling and Analysis Plan (FSAP) and were analyzed for all TCL/TAL parameters. PCBs were found at concentrations greater than the Toxic Substances Control Act (TSCA) - required cleanup level of 10 ppm in four subsurface soil samples collected in a former transformer location of the courtyard area. The estimated volume of contamination that exceeds 10 ppm is 20 cubic yards. No other contaminants were found in the subsurface soil at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Subsurface soil sampling locations are provided in Figure 5-1. A summary of the contaminants detected during subsurface soil sampling activities is presented in table 5-2.

TABLE 5-2

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
1,1,1-Trichloroethane	Yes	Yes	Yes
2-Butanone	No Presence in blanks	No Presence in blanks	No
4-Methyl-2-pentanone	Yes	Yes	Yes
Acetone	Yes	Yes	Yes
Benzene	No Not detected	Yes	Yes
Carbon Disulfide	Yes	Yes	Yes
Chlorobenzene	No Not detected	No Detected once	No
Chloroform	No Detected once	Yes	Yes
Ethylbenzene	Yes	Yes	Yes
Methylene chloride	No Presence in blanks	No Presence in blanks	No
Tetrachloroethylene	No Not detected	Yes	Yes
Toluene	Yes	Yes	Yes
Trichloroethylene	No Not detected	No Detected once	No

TABLE 5-2 (con't)

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS (continued)

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
Vinyl acetate	No Not detected	No Detected once	No
Xylenes	Yes	Yes	**Yes**
4-Nitrophenol	No Detected once	No Not detected	No
Benzoic Acid	No Not detected	No Not detected	No
Bis(2-ethylhexyl)phthalate	Yes	Yes	**Yes**
Di-n-butylphthalate	Yes	Yes	**Yes**
Fluoranthene	No Detected once	No Not detected	No
Pentachlorophenol	No Not detected	No Detected once	No
Phenanthrene	No Detected once	No Not detected	No
Pyrene	No Detected once	No Not detected	No
Aroclor-1254	Yes	No Not detected	**Yes**
Aroclor-1260	Yes	No Not detected	**Yes**
Aluminum	No Comparable to background	No Comparable to background	No

TABLE 5-2 (con't)

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS (continued)

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
Antimony	Yes	Yes	Yes
Arsenic	No Comparable to background	No Comparable to background	No
Barium	No Comparable to background	No Comparable to background	No
Beryllium	No Comparable to background	No Comparable to background	No
Cadmium	No Detected once	No Detected once	No
Calcium	No Comparable to background	No Comparable to background	No
Chromium	No Comparable to background	No Comparable to background	No
Cobalt	No Comparable to background	No Comparable to background	No
Copper	No Comparable to background	No Comparable to background	No
Iron	No Comparable to background	No Comparable to background	No
Lead	No Comparable to background	No Comparable to background	No
Magnesium	No Comparable to background	No Comparable to background	No
Manganese	No Comparable to background	No Comparable to background	No

SUMMARY OF APPLIED CRITERIA FOR CONTAMINANTS OF CONCERN (COCs) IN SURFACE AND SUBSURFACE SOILS (continued)

Chemical	Surface Soils	Subsurface Soils	Evaluated in Risk Assessment?
Mercury	No Detected once	No Not detected	No
Nickel	No Comparable to background	No Comparable to background	No
Potassium	No Comparable to background	No Comparable to background	No
Selenium	No Comparable to background	No Comparable to background	No
Sodium	No Comparable to background	No Comparable to background	No
Thallium	No Not detected	No Not detected	No
Vanadium	No Comparable to background	No Comparable to background	No
Zinc	Yes	No Comparable to background	**Yes**

TABLE 5-3

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SEDIMENTS

Chemical	Shallow Sediments	Deeper Sediments	Chemical of Interest?
1,1,1-Trichloroethane	Yes	Yes	Yes
1,1-Dichloroethane	Yes	No Not detected	Yes
1,2-Dichloroethylene	Yes	No Not detected	Yes
2-Butanone	Yes	No Presence in blanks	Yes
2-Hexanone	Yes	No Not detected	Yes
4-Methyl-2-pentanone	Yes	Yes	Yes
Acetone	Yes	Yes	Yes
Benzene	Yes	No Not detected	Yes
Carbon Disulfide	Yes	Yes	Yes
Chloroform	Yes	No Not detected	Yes
Ethylbenzene	Yes	Yes	Yes
Methylene Chloride	No Presence in blanks	No Presence in blanks	No
Toluene	Yes	Yes	Yes
Trichloroethylene	Yes	No Not detected	Yes

TABLE 5-3 (con't)

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SEDIMENTS (Continued)

Chemical	Shallow Sediments	Deeper Sediments	Chemical of Interest?
Xylenes	Yes	Yes	**Yes**
Benzoic Acid	No Not detected	No Not detected	No
Bis(2-ethylhexyl)phthalate	Yes	Yes	**Yes**
Butylbenzylphthalate	No Not detected	Yes Detected once	No
Di-n-butylphthalate	Yes	No Not detected	**Yes**
Pyrene	Yes	No Not detected	**Yes**
Arochlor-1254	Yes	No Not detected	**Yes**
Arochlor-1260	Yes	No Not detected	**Yes**
Aluminum	No Comparable to background	No Comparable to background	No
Arsenic	Yes	Yes	**Yes**
Barium	No Comparable to background	No Comparable to background	No
Beryllium	Yes	Yes	**Yes**
Calcium	Yes	No Comparable to background	**Yes**

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SEDIMENTS (Continued)

Chemical	Shallow Sediments	Deeper Sediments	Chemical of Interest?
Chromium	Yes	Yes	Yes
Cobalt	Yes	Yes	Yes
Copper	Yes	No Comparable to background	Yes
Iron	Yes	No Comparable to background	Yes
Lead	Yes	No Comparable to background	Yes
Magnesium	No Comparable to background	No Comparable to background	No
Manganese	No Comparable to background	No Not detected	No
Nickel	No Comparable to background	No Not detected	No
Potassium	No Comparable to background	No Comparable to background	No
Selenium	Yes	Yes	Yes
Sodium	No Comparable to background	No Comparable to background	No
Vanadium	No Comparable to background	No Comparable to background	No
Zinc	Yes	Yes	Yes

TABLE 5-4

-31-

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SURFACE WATER

Chemical	Criterion for Deletion	Comments	Chemical of Interest?
1,1,1-Trichloroethane			**Yes**
1,1-Dichloroethane		*Detected once*	**Yes**
4-Methyl-2-pentanone		Detected once	**Yes**
Acetone			**Yes**
Carbon Disulfide			**Yes**
Methylene Chloride	Presence in blanks	All detected concentrations were associated with method blank contamination.	No
Aluminum			**Yes**
Barium			**Yes**
Calcium			**Yes**
Chromium		Detected once	**Yes**
Iron			**Yes**
Magnesium			**Yes**
Manganese			**Yes**

SUMMARY OF SELECTION OF CONTAMINANTS OF CONCERN (COCs) IN SURFACE WATER (Continued)

Chemical	Criterion for Deletion	Comments	Chemical of Interest?
Potassium		Detected once	**Yes**
Sodium			**Yes**
Zinc			**Yes**

<u>Notes</u>:

A limited number of samples were collected, precluding the use of frequency of detection as a criterion for selection as a contaminant of concern.
No Surface water background sample was collected, precluding the use of comparability with background as a criterion for selection as a contaminant of concern.

5.1.6 Sediment Sampling

A total of 16 grab sediment samples from ten locations and 2 composite samples from four locations were collected to characterize the on-site sediment quality. Samples were collected at 0 to 0.5 ft. and 1.5 to 3 ft intervals in accordance with the FSAP. With the exception of the composite samples, all of the samples required by the workplan were analyzed for all TCL/TAL parameters. The composite samples were analyzed for TCL semivolatile organic compound (SVOC), PCBs and pesticide parameters, and TAL parameters. Four additional sediment samples, not described in the RI/FS Workplan were collected and analyzed for Total Organic Carbon (TOC). The TOC results were used in the baseline risk assessment. No contaminants were found in the sediments at concentrations that exceed a Hazrd Quotient of 1 or an upper bound cancer risk of $1x10^{-6}$. Sediment sampling locations are provided in Figure 5-1. A summary of the contaminants detected during sediment sampling activities is presented in table 5-3.

5.1.7 Confirmatory Sampling of Former Courtyard PCB Transformers

Twenty-three soil samples from 13 locations were collected during the RI. These samples were collected to verify that remedial measures to remove courtyard transformers and surrounding soil containing PCBs had achieved the PCB target cleanup level of 10 mg/kg. The samples were collected in accordance with the FSAP and were analyzed for PCBs. Sample locations are provided in Figure 5-1.

6.0 SUMMARY OF SITE RISKS

CERCLA directs the Agency to conduct a baseline risk assessment to determine whether a Superfund Site poses a current or potential threat to human health and the environment in the absence of any remedial action. The baseline risk assessment provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial action.

EPA's cleanup goals for contaminated soils are based on potential for cancer risk range of $1x10^{-4}$ to $1x10^{-6}$ (no more than an increased chance of one additional case in ten thousand to one million) or a non-cancer Hazardous Index above 1.0 (or possible exposure to total contaminants exceeding doses known <u>not</u> to cause harmful effects). The baseline risk assessment indicates that current Site risk from soil contamination exceeds action or cleanup levels only for polychlorinated biphenyls (PCBs).

Past removal activities in the courtyard area have already removed PCB transformers, concrete pads, and PCBs from the soil to 10 milligrams per kilogram (mg/kg) or parts per million (ppm), which is equivalent to the Toxic Substances Control Act (TSCA)-required cleanup level for the small volume and low concentration of PCBs present at the Site. However, 4 samples near the former PCB transformers were found to exceed 10 mg/kg (10 ppm). Concentrations varying from 17.0 to 230.0 mg/kg were identified in these samples at depths ranging from 4 to 5.5 ft. The current estimate of PCB contaminated soil remaining on-site is 20 cubic yards (c.y.). Therefore, soil cleanup will be required in this area to reduce the threat posed by the PCB contamination.

The major risk at the Site, however, is contamination in the shallow groundwater exceeding Maximum Contaminant Levels (MCLS) or other cleanup levels. The RI data indicate that several VOCs were identified in shallow wells primarily located in the courtyard area at levels exceeding MCLs or action levels. The specific VOCs are 1,1,1-trichloroethane (TCA), 1,1-dichloroethylene (DCE), Bis (2-Ethylhexyl) Phthalate (DEHP) and Benzene. In addition to the VOCS, beryllium, antimony, lead, carbon disulfide, Chromium and PCBs (PCBs only in one well) above the MCL were found in the groundwater at levels that exceed cleanup standards. Sample results from the Lower Ocala did not indicate the presence of of any hazardous constituents at levels above MCLs or any other cleanup levels.

The baseline risk assessment also evaluated the health impacts associated with potential future residential development of the manufacturing area and southern portions of the Site. When EPA assumes residents (children and adults) are living on the Site property itself and depend exclusively on local groundwater from the Upper Ocala/Transition Zone as a water source, both upper bound cancer risk (greater than $1x10^{-4}$ or an increased chance of one additional case in ten thousand) and non-cancer hazard estimate (greater than 1.0) do exceed established acceptable risk levels. In all cases unacceptable risks and hazards were a result of drinking contaminated groundwater and breathing volatile groundwater chemicals during showering. In addition, the shallow water-bearing zone does not produce an adequate water supply. However, even if the southern portions of the property were converted to residential, local shallow groundwater would probably not be used because connections to the municipal system are already available. The plant itself is already served by city water and city sewer. The total lifetime cancer risk for potential on-site residents in the southern portions of the Site would be $7x10^{-4}$ (a chance of 7 additional cancer cases in 10,000 people) which exceeds EPA's target range. The Hazard Index for substances causing harmful effects other than cancer would be 17 for this area, which greatly exceeds acceptable exposure and warrants cleanup.

Contaminants of concern (COCs) were chosen based on concentration, toxicity, mobility, and frequency of detection for the contaminants present. EPA expects that meeting cleanup goals for these will result in sufficiently reducing risks posed by less harmful contaminants as well.

6.1 CONTAMINANTS OF CONCERN

The majority of the wastes and residues generated by production operations at the facility have been managed, treated, and disposed of on-site throughout the Site's history. The significant contaminated areas of concern are the courtyard area where shipping, handling, and temporary storage of materials including hazardous substances occured and the burn pit where liquid waste was burned and partially-filled 55-gal drums containing waste materials characteristic of waste rubber cement and Banbury sludge were buried. The chemicals measured in the various environmental media in the Remedial Investigation were evaluated for inclusion as chemicals of potential concern in the risk assessment by application of screening criteria. The criteria used to select the contaminants of concern included:

1. a general review of the Site data,
2. a review of designations to the data,
3. a comparison of the detects with that of the blanks,
4. a review of the sample quantitation limits,
5. a review of the tentatively identified compounds,
6. an evaluation of the apparent statistical distribution of the data,
7. an examination of the Frequency of detection,
8. an evaluation of the contaminants verses essential nutrient trace levels elements, and;
9. a comparison of the appropriate health-based criteria.

Separate lists of chemicals of potential concern were identified for each of the past waste management areas. The contaminants of concern for the Site area include Antimony, Beryllium, Benzene, Carbon Disulfide, Chromium, 1,1-DCE, PCBs, 1,1,1-Trichloroethane, 1,1-Dichloroethylene, Chloroform, Tetrachloroethylene, Toluene, Bis(2ethylhexy)phthalate, Di-n-butylphthalate, 1,1-Dichloroethane, Acetone, Carbon Disulfide, Ethylbenzene, Trichloroethylene, Xylenes, 2-Methyl-2-pentanone, Polychlorinated Biphenyls, 2-Butanone, 1,2-Dichloroethylene, 2-Hexanone, Pyrene, Magnesium, Selenium, and Zinc.

The arithmetic average concentrations, 95% upper confidence levels, and frequency of detections of contaminants found in the various media tested are contained in Tables 6-1 through 6-8. The exposure concentrations represent a 95% upper confidence limit on the mean of data collected from both surface and

TABLE 6-1
CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER
RESIDUUM WELLS

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1,1-TCA	5.9	22.81	4/8
1,1-DCA	11.3	48.69	4/8
1,1-DCE	3.3	10.53	4/8
ACETONE	8.7	15.92	3/8
BENZENE	6.7	17.41	1/8
CARBON DISULFIDE	49.5	1584.93	6/8
DEHP	10.9	25.73	2/9
ENDOSULFAN	0.06	0.11	1/9
LINDANE	0.04	0.06	1/9
ALUMINUM	15,955.56	58,348.03	9/9
ANTIMONY	18.2	39.91	1/9
BARIUM	86.86	263.57	9/9
BERYLLIUM	2.01	6.89	5/9
CALCIUM	6345.56	16,307.84	9/9
CHROMIUM	31.13	82.61	6/9
COBALT	17.93	138.63	4/9
COPPER	56.31	429.19	5/9
IRON	34,477.78	135,064.73	9/9
LEAD	13.39	49.29	6/9
MAGNESIUM	2,271.11	8,294.92	8/9
MANGANESE	962.48	10,621.48	9/9
MERCURY	0.19	0.34	1/9
NICKEL	20.80	151.20	3/9
POTASSIUM	1,247.89	2,076.67	8/9
SELENIUM	0.83	1.09	1/9

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
SODIUM	66,060.00	1,758,114.10	9/9
THALLIUM	1.00	1.39	1/9
VANADIUM	87.51	389.46	8/9
ZINC	128.46	382.51	8/9

TABLE 6-2
CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER
UPPER OCALA

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1,1-TCA	35.82	45.06	8/25
1,1-DCA	19.87	28.60	9/25
1,1-DCE	37.20	63.77	7/25
ACETONE	15.46	21.49	16/25
BENZENE	6.24	8.43	1/25
CARBON DISULFIDE	12.57	20.06	14/25
CHLOROBENZENE	3.41	4.49	1/25
CHLOROFORM	3.44	3.83	1/25
ETHYLBENZENE	13.96	11.15	2/25
METHYLENE CHLORIDE	2.78	3.49	2/25
TOLUENE	3.94	6.21	2/25
XYLENES	35.22	18.55	3/25
BENZOIC ACID	25.46	32.64	1/24
DEHP	12.52	19.92	1/24
ALUMINUM	15,222.50	455,974.04	22/25
ANTIMONY	14.33	17.97	2/25
ARSENIC	1.04	1.12	1/25
BARIUM	122.60	203.33	25/25

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
BERYLLIUM	4.25	7.96	11/25
CADMIUM	3.19	3.30	3/25
CALCIUM	165,624.00	343,794.52	25/25
CHROMIUM	36.04	105.63	19/25
COBALT	16.07	34.23	10/25
COPPER	62.45	120.95	15/25
IRON	17,059.52	618,528.15	25/25
LEAD	20.02	53.74	23/25
MAGNESIUM	2,301.56	3,720.64	25/25
MANGANESE	1,326.06	17,629.19	25/25
MERCURY	0.16	0.19	4/25
NICKEL	25.84	58.28	5/25
POTASSIUM	4,629.74	8,529.40	24/25
SILVER	1.76	2.07	1/25
SODIUM	23,396.40	44,621.76	25/25
THALLIUM	1.06	1.23	4/25
VANADIUM	66.41	260.02	19/25
ZINC	174.66	303.89	23/25

TABLE 6-3
CONCENTRATIONS OF CONTAMINANTS FOUND IN GROUNDWATER
LOWER OCALA

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1-DCA	1.22	6.85	1/9
1,1-DCE	1.19	6.23	1/9
ACETONE	84.89	4,068.95	7/9
BDCM	1.28	6.84	2/9

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
CARBON DISULFIDE	7.52	445.80	4/9
CHLOROFORM	1.81	11.43	4/9
DBCM	1.23	5.96	2/9
METHYLENE CHLORIDE	0.71	1.97	1/9
PCE	1.22	5.86	2/9
TOLUENE	1.23	5.98	2/9
TCE	1.35	8.06	2/9
BENZOIC ACID	21.56	31.23	2/9
DEHP	20.50	112.30	3/9
PHENOL	12.61	26.64	2/9
ENDOSULFAN	0.05	0.08	1/9
ALUMINUM	2,023.99	3,004,155.15	7/9
ARSENIC	1.67	2.65	3/9
BARIUM	61.97	661.65	8/9
CALCIUM	37,755.56	83,246.94	9/9
CHROMIUM	41.92	529.53	6/9
COBALT	1.95	2.59	1/9
COPPER	15.54	37.39	8/9
IRON	4,171.89	19,917,768.30	8/9
LEAD	12.83	259.11	7/9
MAGNESIUM	1,170.72	3,644.06	8/9
MANGANESE	69.75	3,754.47	8/9
NICKEL	11.02	26.86	1/9
POTASSIUM	21,514.78	795,607.35	7/9
SODIUM	23,010.00	268,734.73	9/9
THALLIUM	0.72	2.81	2/9
VANADIUM	9.86	75.38	5/9
ZINC	249.22	1,328.35	9/9

TABLE 6-4
CONCENTRATIONS OF CONTAMINANTS FOUND IN SOILS
SURFACE SOILS (0-1 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	13.16	39.05	15/17
2-BUTANONE	15.03	13.02	1/7
4-M-2-P	7.53	11.56	3/17
ACETONE	118.29	508.64	15/17
CARBON DISULFIDE	15.29	24.24	17/17
CHLOROFORM	2.76	3.16	1/17
ETHYLBENZENE	2.66	3.23	11/17
METHYLENE CHLORIDE	41.41	396.82	10/17
TOLUENE	9.06	19.61	15/17
XYLENES	7.44	11.20	12/17
4-NITROPHENOL	1,010.00	1,459.81	1/17
DEHP	327.47	453.45	5/17
DBP	172.59	236.96	3/17
FLUORANTHENE	211.76	246.39	1/17
PHENANTHRENE	206.71	265.70	1/17
PYRENE	211.76	246.39	1/17
ARCLR-1254	287.94	347.80	1/17
ARCLR-1260	240.29	316.50	3/17
ALUMINUM	9,334.12	12,644.69	17/17
ANTIMONY	3.80	6.44	8/17
ARSENIC	1.61	2.35	17/17
BARIUM	19.79	27.25	17/17
BERYLLIUM	0.19	0.25	5/17
CADMIUM	0.29	0.45	1/17
CALCIUM	3,426.00	12,469.49	17/17
CHROMIUM	13.82	18.47	17/17

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
COBALT	1.26	1.87	13/17
COPPER	3.92	5.32	3/17
IRON	12,256.82	17,522.41	17/17
LEAD	9.72	16.01	6/17
MAGNESIUM	176.71	265.38	17/17
MANGANESE	127.69	223.29	17/17
MERCURY	0.05	0.06	1/17
NICKEL	2.63	4.77	8/17
POTASSIUM	112.72	176.42	15/17
SELENIUM	0.19	0.22	3/17
SODIUM	37.73	45.17	16/17
VANADIUM	37.34	51.83	17/17
ZINC	26.92	127.68	14/17

TABLE 6-5
CONCENTRATIONS OF CONTAMINANTS FOUND IN SOILS
SUBSURFACE SOILS (3-30 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	61.83	318.22	14/21
2-BUTANONE	45.43	53.64	4/21
4-M-2-P	37.38	26.46	8/21
ACETONE	322.81	567.61	21/21
BENZENE	19.62	12.22	2/21
CARBON DISULFIDE	28.62	51.11	11/21
CHLOROBENZENE	19.69	11.92	1/21
CHLOROFORM	19.60	11.79	4/21
ETHYLBENZENE	19.60	12.14	8/21
METHYLENE CHLORIDE	51.05	323.05	12/21

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
PCE	19.95	12.62	3/21
TOLUENE	20.83	19.97	14/21
TCE	19.69	11.92	1/21
VINYL ACETATE	42.90	35.18	1/21
XYLENES	22.26	22.21	11/21
DEHP	266.43	359.84	5/21
DBP	249.10	310.18	2/21
PENTACHLOROPHENOL	1304.76	1801.62	1/21
ALUMINUM	6647.14	9345.01	21/21
ANTIMONY	6.99	14.48	6/21
ARSENIC	0.96	1.62	13/21
BARIUM	6.62	10.24	20/21
BERYLLIUM	0.20	0.23	4/21
CADMIUM	0.52	0.76	1/21
CALCIUM	256.17	753.00	13/21
CHROMIUM	8.74	15.02	21/21
COBALT	1.38	2.45	9/21
COPPER	2.22	3.47	1/21
IRON	16010.48	45244.84	21/21
LEAD	6.05	9.97	5/21
MAGNESIUM	85.96	108.77	21/21
MANGANESE	48.19	125.12	21/21
NICKEL	1.65	1.87	7/21
POTASSIUM	84.36	138.42	12/21
SELENIUM	0.18	0.23	3/21
SODIUM	37.56	47.41	18/21
VANADIUM	37.01	82.53	20/21
ZINC	4.11	9.45	15/21

TABLE 6-6
CONCENTRATIONS OF CONTAMINANTS FOUND IN SEDIMENTS
SHALLOW SEDIMENTS (0-1 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	5.31	9.22	6/8
1,1-DCA	5.31	9.27	1/8
2-BUTANONE	5.44	42.62	1/8
2-HEXANONE	12.94	23.17	1/8
4-M-2-P	40.81	193.66	1/8
ACETONE	38.88	247.55	7/8
BENZENE	5.56	8.42	1/8
CARBON DISULFIDE	20.63	45.98	8/8
CHLOROFORM	6.69	15.35	3/8
ETHYLBENZENE	3.44	4.30	4/8
METHYLENE CHLORIDE	83.94	23075.09	7/8
TOLUENE	5.81	8.98	3/8
TCE	5.56	8.42	1/8
XYLENES	10.81	34.24	4/8
DEHP	385.00	526.71	1/6
DBP	355.83	660.96	1/8
PYRENE	345.33	1090.88	1/8
AROCLOR-1254	899.17	4335.37	1/6
AROCLOR-1260	858.33	4928.70	1/8
ALUMINUM	12110.00	42349.18	6/6
ARSENIC	2.06	4.49	6/6
BARIUM	25.23	53.76	6/6
BERYLLIUM	0.43	1.65	4/6
CALCIUM	3403.67	23169.79	6/6
CHROMIUM	276.18	25730.51	6/6
COBALT	3.68	18.74	4/8

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
COPPER	25.38	92.23	6/6
IRON	28060.00	289755.56	6/6
LEAD	22.87	47.79	6/6
MAGNESIUM	183.43	704.50	6/6
MANGANESE	86.12	254.74	6/6
NICKEL	3.48	40.72	1/6
POTASSIUM	134.67	524.66	2/6
SELENIUM	0.26	0.43	2/6
SODIUM	60.52	236.52	4/6
VANADIUM	80.72	173.98	6/6
ZINC	486.42	26676.25	6/6

TABLE 6-7
CONCENTRATIONS OF CONTAMINANTS FOUND IN SEDIMENTS
SUB-SURFACE SEDIMENTS (2-3 FT)

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
1,1,1-TCA	4.60	17.05	5/5
4-M-2-P	16.80	2580.57	4/5
ACETONE	64.60	5436.88	5/5
CARBON DISULFIDE	13.60	39.41	5/5
ETHYLBENZENE	2.80	6.63	1/5
METHYLENE CHLORIDE	88.40	338.31	5/5
TOLUENE	2.00	4.92	4/5
XYLENES	3.40	3.86	1/5
DEHP	1267.50	91849.55	3/6
BBP	289.50	693.26	1/6
ALUMINUM	7616.67	13202.68	6/6

CONTAMINANT	AVERAGE CONCENTRATION (ug/kg)	95% UPPER CONFIDENCE LIMIT (ug/kg)	FREQUENCY OF DETECTION
ARSENIC	1.84	2.47	6/6
BARIUM	11.82	12.17	6/6
BERYLLIUM	0.38	0.90	5/6
CALCIUM	1313.00	1313.49	6/6
CHROMIUM	57.50	58.36	6/6
COBALT	2.56	3.41	4/6
COPPER	8.03	8.36	5/6
IRON	21233.33	21233.89	6/6
LEAD	12.71	13.20	5/8
MAGNESIUM	61.70	62.19	6/6
MANGANESE	70.22	71.00	6/6
POTASSIUM	64.15	64.45	1/8
SELENIUM	0.19	0.52	1/6
SODIUM	48.48	49.04	4/6
VANADIUM	76.37	76.69	6/6
ZINC	85.02	85.95	6/6

TABLE 6-8
CONCENTRATIONS OF CONTAMINANTS FOUND IN SURFACE WATER

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
1,1,1-TCA	4.20	8.01	2/5
1,1-DCA	2.90	4.53	1/5
4-M-2-P	4.40	7.84	1/5
ACETONE	11.00	56.35	5/5
CARBON DISULFIDE	11.00	56.35	5/5
METHYLENE CHLORIDE	9.40	2246.66	1/5
ALUMINUM	196.00	659.06	4/4

CONTAMINANT	AVERAGE CONCENTRATION (ug/L)	95% UPPER CONFIDENCE LIMIT (ug/L)	FREQUENCY OF DETECTION
BARIUM	12.73	327.94	2/4
CALCIUM	8070.00	11577.16	4/4
CHROMIUM	6.53	28.61	1/4
IRON	550.50	688.37	4/4
MAGNESIUM	390.75	519.33	4/4
MANGANESE	48.40	1101.99	4/4
POTASSIUM	436.00	10144.23	1/4
SODIUM	2455.00	4158.22	4/4
ZINC	76.40	23840.22	3/4

subsurface samples and therefore, the data in the Table does not necessarily reflect land surface concentrations.

6.2 EXPOSURE ASSESSMENT

Whether a chemical is actually a concern to human health and the environment depends upon the likelihood of exposure, i.e. whether the exposure pathway is currently complete or could be complete in the future. A complete exposure pathway (a sequence of events leading to contact with a chemical) is defined by the following four elements:

- a source and mechanism of release from the source,
- a transport medium (e.g., surface water, air) and mechanisms of migration through the medium,
- the presence or potential presence of a receptor at the exposure point, and
- a route of exposure (ingestion, inhalation, dermal absorption).

If all four elements are present, the pathway is considered complete.

An evaluation was undertaken of all potential exposure pathways which could connect chemical sources at the Site with potential receptors. All possible pathways were first hypothesized and evaluated for completeness using EPA's criteria. Three current potentially complete exposure pathways and four future exposure pathways remained after screening. The current pathways represent exposure pathways which could or do exist under current Site conditions while the future pathways represent exposure pathways which could exist, in the future, if the current exposure conditions change.

According to the Dougherty County Planning Commission, residential use of this land is possible. In addition, industrial operation to the east would not serve as an absolute obstruction to residential development in the southern portion of the Site and to the west. As a result, a future potential residential scenario for residents living on the southern portions of the facility property was developed and evaluated.

The exposure and intake parameters used in generating risk caused by current and future scenarios are presented in Tables 6-9 through 6-14. Exposure by each of these pathways was mathematically modeled using generally conservative assumptions and is further discussed in Section 6.5.

The current pathways are:

- on-site worker
- off-site residential populations
- trespassers

The future pathways are:

- on-site worker
- off-site residential populations
- trespassers
- residents living on the southern portion of the Site

The exposure point concentrations for each of the chemicals of concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways, with the exception of the groundwater pathway. The chronic daily intakes were then used in conjunction with cancer potency factors and noncarcinogenic reference doses to evaluate risk. No current sensitive subpopulations were localized to the Site's area during the exposure assessment.

TABLE 6-9

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INGESTION AND DERMAL EXPOSURE TO SOIL BY WORKERS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in soil (Cs)	95% upper confidence limit concentration or maximum concentration of surface soils in manufacturing area	Represents reasonable maximum exposure concentration. Recommended in "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual" (RAGS), EPA/540/1-89/002, 12/89.
Skin surface area (SA)	3200 cm^2/event (dy)	Represents exposure of hands and arms. Workers unlikely to wear short pants or partially exposing clothing other than shorter sleeves of shirt. No seasonal variation because of the mild climate of southern Georgia.
Adherence factor (AF)	0.6 mg/cm^2	Middle value of range recommended by EPA Region IV (0.2 mg/cm^2 - 1.0 mg/cm^2).
Absorption factor (ABS)	1% for organic chemicals 0.1% for inorganic chemicals	EPA Region IV supplemental risk assessment guidance (2/11/92).
Soil ingestion rate (IR)	50 mg/dy	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, 3/25/91.
Fraction ingested from contaminated source (FI)	1.0	Assumes that all soil ingested during working hours is impacted.
Exposure frequency (EF)	250 dy/yr (5 dy/wk; 50 wk/yr)	Conventional work frequency (SDEF, 3/25/91).
Exposure duration (ED)	25 yr	Conventional work duration (SDEF, 3/25/91).
Body weight (BW)	70 kg	Conventional adult body weight (RAGS, 12/89).
Averaging time (AT)	Non-carcinogens: 365 d/yr x 25 yr Carcinogens: 365 dy/yr x 70 yr	Conventional averaging times (RAGS, 12/89).

TABLE 6-10

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING EXPOSURE TO SEDIMENTS AND SURFACE WATER BY WORKERS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in sediments (Cs)	95% upper confidence limit concentration or maximum concentration in sediments of manufacturing area	Represents reasonable maximum exposure concentration. Recommended by "Risk Assessment Guidance for Superfund" (RAGS), EPA/540/1-89/002 (12/89).
Sediment ingestion rate (IR)	50 mg/day	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, (3/25/91).
Fraction ingested from contaminated source (FI)	1.0	Assumes all of soil and water contacted by workers is impacted.
Skin surface area (SA)	3200 cm^2	Represents surface area of the hands and forearms.
Soil to skin adherence factor (AF)	0.6 mg/cm^2	Middle value of range recommended by EPA Region IV (0.2 mg/cm^2 - 1.0 mg/cm^2).
Absorption factor (ABS) (for sediments)	1% for organic chemicals 0.1% for inorganic chemicals	EPA Region IV Supplemental Risk Assessment Guidance (2/11/92).
Chemical concentration in water (CW)	95th upper confidence limit or maximum concentration of surface water sampled from manufacturing area.	Represents reasonable maximum exposure concentration.
Dermal permeability constant (PC) (For surface water)	Chemical-specific	Values selected from EPA's "Interim Guidance for Dermal Exposure Assessment", OHEA-E-367 (3/91) and Flynn (1990) as cited in OHEA-E-367.
Exposure time (ET)	1 hr/day	Exposure to sediments and surface water in east drainage ditch is expected to be minimal, generally occurring only when grounds are landscaped.
Exposure frequency (EF)	24 days/yr	Exposure to sediments and surface water in east drainage ditch is expected to be minimal, generally occurring only when grounds are landscaped. A reasonable maximum amount of time performing landscaping is every other week year-round.
Exposure duration (ED)	25 years	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, (3/25/91).
Body weight (BW)	70 kg	Conventional adult body weight (RAGS 12/89).
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Conventional averaging times (RAGS 12/89).

TABLE 6-11

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INHALATION EXPOSURE TO PARTICLE AND VAPOR PHASE CHEMICALS BY WORKERS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical Concentration in air (CA)	Modeled value based on 95% upper confidence limit concentration of chemical in soil or maximum concentration	Represents reasonable maximum exposure concentration. Recommended by "Risk Assessment Guidance for Superfund" (RAGS), EPA/540/1-89/002, 12/89.
Inhalation rate (IR)	20 m^3/workday (2.5 m^3/hr)	"Standard Default Exposure Factors" (SDEF), OSWER Directive 9285.6-03, 3/25/91.
Exposure time (ET)	5 hr/wk (1 hr/dy; 5 dy/wk)	Majority of work occurs in manufacturing building. Only occasional intermittent exposure outside is expected.
Exposure frequency (EF)	50 wk/yr (250 dy/yr)	Conventional work frequency (SDEF, 3/25/91).
Exposure duration (ED)	25 yr	Conventional work duration (SDEF 3/25/91).
Body weight (BW)	70 kg	Conventional adult body weight (RAGS 12/89).
Averaging time (AT)	Non-carcinogens: 365 dy/yr x 25 yr Carcinogens: 365 dy/yr x 70 yr	Conventional averaging times (RAGS 12/89).

TABLE 6-12

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INGESTION OF GROUNDWATER, INHALATION OF VOLATILE CHEMICALS IN GROUNDWATER AND DERMAL CONTACT WITH GROUNDWATER BY POTENTIAL FUTURE ON-SITE RESIDENTS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in groundwater (CW)	95% upper confidence limit or maximum concentration in Upper Ocala wells in manufacturing/burn pit area or southern/western area	Represents reasonable maximum exposure ("Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A)" EPA/540/1-89/002, 12/89 (RAGS).
Chemical concentration in air (CA) (showering)	Modeled value based on 95% upper confidence limit or maximum concentration in Upper Ocala wells in manufacturing/burnpit area or southern/western area	Represents reasonable maximum exposure ("Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A)" EPA/540/1-89/002, 12/89 (RAGS). Modeled air concentrations are presented in other tables.
Ingestion rate (IR)	1 liter/day (ages 0-6) 2 liters/day (adults)	EPA's "Exposure Factors Handbook" (EPA/600/8/-89/043, 7/89) describes several different drinking water intake rates for children: 1 liter per day for children under 10 kg, 0.9 L/day for 2 year olds, 1.5 L/day for children 14-16 years, an average of 0.76 L/day for children 0 to 9, and a range of 1-1.7 L/day for children 5-14 yrs. EPA guidance does not recommend one value. A value of 1 L/day for children of age 0-6 is consistent with the ranges cited in this guidance, and corresponds to the age group in which soil ingestion also varies from adult intakes. A value of 2 L/day for adults is recommended in RAGS for reasonable maximum exposures (RAGS 12/89).
Inhalation rate (IR)	0.6 m^3/hr (0.01 m^3/min)	Recommended inhalation rate for showering for all age groups (RAGS, 12/89).
Skin surface area (SA)	0.73 m^2 for children 1.94 m^2 for adults	50th percentile male child body surface area for ages 3-6 (RAGS, 12/89), used to represent 0-6 yr olds, as well. 50th percentile adult male body surface area (RAGS, 12/89).
Dermal permeability constant (PC)	Chemical-specific	Values selected from EPA's "Dermal Exposure Assessment: Principles and Applications" EPA/600/8-91/011B, 1/92, and Flynn (1990) as cited in this report.
Exposure time for showering (ET)	12 min/event (day) (0.2 hr/event)	90th percentile time for showering (RAGS 12/89). Assumed to be the same length of time for bathing in younger children.
Exposure frequency (EF)	350 dy/yr	"Standard Default Exposure Factors", OSWER Directive 9285.6-03 (3/25/91).
Exposure duration (ED)	6 years for children 24 years for adults (total 30 yr)	RAGS, 12/89.
Body weight (BW)	15 kg for children (age 0-6) 70 kg for adults	RAGS, 12/89.
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Convention averaging times (RAGS 12/89).

TABLE 6-13

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING INGESTION AND DERMAL CONTACT WITH SURFACE SOILS FOR POTENTIAL FUTURE ON-SITE RESIDENTS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in soil (CS)	95% upper confidence limit or maximum concentration in surface soils at the manufacturing or southern/western area	Represents reasonable maximum exposure ("Risk Assessment Guidance for Superfund - Volume I: Human Health Evaluation Manual (Part A)", EPA/540/1-89/002, 12/89 (RAGS).
Soil ingestion rate (IR)	200 mg/day for children (age 0-6) 100 mg/day for adults (> 6 yr)	RAGS, 12/89.
Fraction ingested from contaminated source (FI)	1.0	Assumes that all soil ingested is contaminated
Skin surface area (SA)	2000 cm^2 for children 3200 cm^2 for adults	Represents hands, one-half of arms and one-half of legs for children (RAGS, 12/89). Represents hands and arms (or hands and about one-third of legs and arms) for adults (RAGS, 12/89).
Adherence Factor (AF)	0.6 mg/cm^2	Middle value of range recommended by EPA Region IV (0.2-1.0 mg/cm^2) in supplemental risk assessment guidance (2/11/92).
Dermal absorption factor (ABS)	1% for organic chemicals 0.1% for inorganic chemicals	EPA Region IV supplemental risk assessment guidance (2/11/92).
Exposure frequency (EF)	350 dy/yr	EPA's "Standard Default Exposure Factors" OSWER Directive 9285.6-03, 3/25/91.
Exposure duration (ED)	6 yr at child parameters 24 yr at adult parameters (total 30 yr)	RAGS 12/89.
Body weight (BW)	15 kg (ages 0-6) 70 kg (6-24 years)	RAGS, 12/89.
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Conventional averaging time (RAGS 12/89)

TABLE 6-14

EXPOSURE AND INTAKE PARAMETERS FOR ASSESSING EXPOSURE TO VOLATILIZED SOIL CHEMICALS AND ENTRAINED SOIL PARTICLES FOR POTENTIAL FUTURE ON-SITE RESIDENTS

Exposure or Intake Parameter	Value	Rationale/Discussion/Reference
Chemical concentration in air (CA)	Modeled value based upon 95% upper confidence limit or maximum concentration in soil at either manufacturing area of southern/western site	Represents reasonable maximum exposure.
Inhalation rate (IR) (while outdoors)	5 m^3/day for children (0-6) 5 m^3/day for adults (6-24)	"Standard Default Exposure Factors" (OSWER Directive 9285.6-03 (3/25/91) recommends a total daily inhalation rate of 20 m^3/day, 15 m^3/day of which is indoor exposure, The remaining portion (5 m^3/day) is assumed to result from outdoor exposure. Child inhalation rates are approximately the same ("Exposure Factors Handbook" EPA/600/8-89/043, 7/89).
Exposure frequency (EF)	350 dy/yr	"Standard Default Exposure Factors" (OSWER Directive 9285.6-03 (3/25/91).
Exposure duration (ED)	6 yr (ages 0-6) 24 yr (ages 6-24) 30 years total	30 year exposure is 90th percentile amount of time residing in one location ("Risk Assessment Guidance for Superfund-Volume I: Human Health Evaluation Manual (Part A)" EPA/540/1-89/002, 12/89, (RAGS)).
Body weight (BW)	15 kg (ages 0-6 yr) 70 kg (ages 6-24)	RAGS, 12/89.
Averaging time (AT)	Non-carcinogens: 365 dy/yr x ED Carcinogens: 365 dy/yr x 70 yr	Conventional averaging time (RAGS, 12/89).

6.3. TOXICITY ASSESSMENT

Toxicity values are used in conjunction with the results of the exposure assessment to characterize Site risk. EPA has developed critical toxicity values for carcinogens and noncarcinogens. Cancer Slope Factors (CSFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs, which are expressed in units of $(mg/kg/day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg/day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CSF. Use of this conservative approach makes underestimation of the actual cancer risk highly unlikely. Cancer Slope Factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. The CSFs for oral ingestion and inhalation exposure to the contaminants of concern at the Site are contained in Table 6-15.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. The RfDs for oral ingestion and inhalation exposure to the contaminants of concern at the Site are contained in Table 6-15. The following information corresponds with the alphabets located in the "Weight of Evidence Category" column of the table.

> Group A - Human Carcinogen; Group B - Probable Human Carcinogen (B1 - limited evidence from epidemiologic studies; B2 - Sufficient evidence from animal studies and inadequate or no data from epidemiologic studies); Group C - Possible Human Carcinogen; Group D - Not Classifiable as to Human Carcinogenicity and Group NE - Evidence of Non-Carcinogenicity for humans.

TABLE 6-15

CHRONIC REFERENCE DOSES (RfDs) AND CANCER SLOPE FACTORS (SFs) FOR CONTAMINANTS OF CONCERN (COCs)

Chemical	Oral Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Inhalation Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Oral Slope Factor $(mg/kg\text{-}dy)^{-1}$	Inhalation Slope Factor $(mg/kg\text{-}dy)^{-1}$	Weight of Evidence Category
2-Butanone	0.05[2]	1000	0.09	1000			D
1,1-Dichloroethane (1,1-DCA)	0.1	1000	0.1	1000	ND	ND	C
1,1-Dichloroethylene (1,1-DCE)	0.009	1000	ND		0.6	1.2	C
1,2-Dichloroethylene[1] (1,2-DCE)	0.02	1000	ND				NE
1,1,1-Trichloroethane (1,1,1-TCA)	0.09[2]	1000	0.3	1000			D
4-Methyl-2-pentanone (4-M-2-P)	0.05[2]	1000	0.02	1000			NE
Acetone	0.1	1000	ND				D
Benzene					0.029	0.029	A
Bis(2-ethylhexyl)-phthalate (DEHP)	0.02	1000	ND		0.014	ND	B2
Carbon Disulfide	0.1	100	0.0028	1000			NE
Chloroform	0.01	1000	ND		0.0061	0.0875	B2
Di-n-butylphthalate	0.1	1000	ND				D
Ethylbenzene	0.1	1000	0.29	300			D

TABLE 6-15 (con't)

CHRONIC REFERENCE DOSES (RfDs) AND CANCER SLOPE FACTORS (SFs) FOR CONTAMINANTS OF CONCERN (COCs) AND OTHER CHEMICALS CONSIDERED IN THE BASELINE RISK ASSESSMENT

Chemical	Oral Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Inhalation Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Oral Slope Factor $(mg/kg\text{-}dy)^{-1}$	Inhalation Slope Factor $(mg/kg\text{-}dy)^{-1}$	Weight of Evidence Category
Polychlorinated Biphenyls (PCBs)	ND		ND		7.7	ND	B2
Pyrene	0.03	3000	ND				D
Tetrachloroethylene (PCE)	0.01	1000	ND		0.051	0.00182	B2
Toluene	0.2	1000	0.57	100			D
Trichloroethylene (TCE)	ND		ND		0.011[3]	0.017[3]	B2
Xylenes	2	100	0.086	100			D
Antimony	0.0004	1000	ND				NE
Arsenic	0.0003	3	ND		1.75	15	A
Barium	0.05	100	0.0001	1000			NE
Beryllium	0.005	100	ND		4.3	8.4	B2
Cadmium	0.0005 (water)	10	ND		ND	6.1	B1
Chromium (trivalent)	1	1000	5E-07	300		[illegible]	NE

TABLE 6-15 (con't)

CHRONIC REFERENCE DOSES (RfDs) AND CANCER SLOPE FACTORS (SFs) FOR CONTAMINANTS OF CONCERN (COCs) AND OTHER CHEMICALS CONSIDERED IN THE BASELINE RISK ASSESSMENT

Chemical	Oral Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Inhalation Reference Dose (mg/kg-dy)	Uncertainty and Modifying Factors	Oral Slope Factor $(mg/kg\text{-}dy)^{-1}$	Inhalation Slope Factor $(mg/kg\text{-}dy)^{-1}$	Weight of Evidence Category
Chromium (hexavalent)	0.005	500	5E-07	300		41	A
Copper	0.037[3]	NA	ND				D
Lead	ND		ND		ND	ND	B2
Manganese	0.1	1	0.0001	900			D
Nickel	0.02	300	ND		0.84 (refinery dust)	ND	A
Selenium	0.005	3	ND				D
Vanadium	0.007	100	ND				D
Thallium	0.00007 (soluble salts)	3000	ND				NA
Zinc	0.2	10	ND				D

1. Values are presented for trans-1,2-dichloroethylene (t-1,2-DCE). Site was analyzed for total 1,2-DCE.
2. The toxicity value for this chemical has been recently withdrawn by EPA for further evaluation. The value presented is from the EPA's Health Effects Assessment Summary Tables.
3. Calculated from the drinking water standard of 1.3 mg/L.

ND Not developed; NE Not evaluated; NA Not applicable

All values from this table were obtained from EPA's Integrated Risk Information System (IRIS) accessed on January 22-25, 1992. If IRIS did not contain toxicity values, EPA's Health Effects Assessment Summary Tables, FY-91 (OERR 9200.6-303 (91-1), January 1991, was consulted.
The following chemicals were selected as chemicals of interest in some or all media, but do not possess toxicity values with which to perform an assessment: 2-hexanone, aluminum, calcium, cobalt, iron, magnesium, potassium and sodium.

6.4 RISK CHARACTERIZATION

Human health risks are characterized for potential carcinogenic and noncarcinogenic effects by combining exposure and toxicity information. Excessive lifetime cancer risks are determined by multiplying the estimated daily intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in one million additional (above their normal risk) chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the assumed specific exposure conditions at a Site.

The Agency considers individual excess cancer risks in the range of 1×10^{-4} to 1×10^{-6} as protective; however the 1×10^{-6} risk level is generally used as the point of departure for setting cleanup levels at Superfund Sites. The point of departure risk actions that result in risks at the more protective end of the risk range.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). A HQ which exceeds one (1) indicates that the daily intake from a scenario exceeds the chemical's reference dose. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. An HI which exceeds unity indicates that there may be a concern for potential health effects resulting from the cumulative exposure to multiple contaminants within a single medium or across media.

The health risks resulting from exposure to the current pathways are as follows:

Overall, the baseline risk assessment indicates the unacceptable health hazards and risks are not posed to humans currently having access to the Site. The summed upper bound cancer risks for reasonable maximum exposures to current workers at the Site is within the acceptable risk range and the non-carcinogenic Hazard Index is below the comparison Hazard Index threshold value of 1.0. The overall upper bound cancer risks for reasonable maximum exposures to trespassers, both youths and adults, is at or below the lower end of the risk range(1×10^{-6}), and noncarcinogenic Hazard Indices are below 1.0.

The health risk resulting from exposure potential future pathway are as follows:

The baseline risk assessment also evaluated the health impacts associated with potential future residential development of the manufacturing area and southern portions of the Site. When EPA assumes residents (children and adults) are living on the Site property itself and depend exclusively on local groundwater from the Upper Ocala/Transition Zone as a water source, both upper bound cancer risk (greater than $1x10^{-4}$ or an increased chance of one additional case in ten thousand) and non-cancer hazard estimate (greater than 1.0) do exceed established acceptable risk levels. In all cases unacceptable risks and hazards were a result of drinking contaminated groundwater and breathing volatile groundwater chemicals during showering. However, even if the property were converted to residential, local shallow groundwater would not be used because connections to the municipal system are already available. In addition, the shallow water-bearing zone does not produce an adequate water supply. The plant itself is already served by city water and city sewer. The total lifetime cancer risk for potential on-site residents in the southern portions of the Site would be $7x10^{-4}$ (a chance of 7 additional cancer cases in 10,000 people) which exceeds EPA's target range. The Hazard Index for substances causing harmful effects other than cancer would be 17 for this area, which greatly exceeds acceptable exposure and warrants cleanup. A summary of cancer risk and non-carcinogenic health hazard estimates for all scenarios considered at the Site and designation of chemicals and media for which remediation levels were derived are presented in Table 6-16. A potential on-site resident in the manufacturing area scenario was presented in the FS. After review, EPA has determined that the scenario is not a probable land use for that portion of the Site. However, "potential on-site residents in the southern portions of the Site" scenario shall be included with the factors used to develop the contaminants of concern for this Site. The following table presents each chemical that poses unacceptable risks for all scenario considered.

6.5 ENVIRONMENTAL RISK

There are two distinct vegetation zones at the site: a maintained grassy area on the north half of the Site and a natural-type area on the south half. The grassy area lies to the west of the manufacturing plant, and is periodically mowed in certain areas. This area contains scattered areas of some hydrophytic vegetation. Most of the hydrophytic vegetation is in a small wetland area along Sylvester Road.

Table 6-16 Summary of Cancer Risk & Non-Carcinogenic Health Hazard Estimates/Determination of Media Requiring Cleanup							
RECEPTOR	MEDIUM	NON-CARCINOGENIC HAZARD INDEX (all exposure routes)	CHEMICALS WITH HAZARD QUOTIENT GREATER THAN 1	CLEANUP LEVELS DERIVED ?	UPPERBOUND CANCER RISKS (all exposure routes)	CHEMICALS WITH A RISK GREATER THAN $1X10^{-6}$	CLEANUP LEVELS DERIVED?
Current Worker	Soil	0.06	None	No	$3x10^{-5}$	PCBs	Yes
	Sediments	0.0008	None	No	$1X10^{-7}$	None	No
	Surface Water	0.0002	None	No	—	—	No
Adult Trespasser	Soil	0.3	None	No	$2x10^{-8}$	None	No
	Sediments	0.005	None	No	$1x10^{-6}$	None	No
	Surface Water	0.03	None	No	NA	NA	No
Youth Trespasser	Soil	0.5	None	No	$8x10^{-9}$	None	No
	Sediments	0.006	None	No	$5x10^{-7}$	None	No
	Surface Water	0.04	None	No	—	—	No
Potential Adult Off-site Residents	Groundwater	0.04	None	No	$7x10^{-5}$	1,1-Dichloroethene, (1,1-DCE)	Yes
Potential On-Site Residents Southern Site	Groundwater	17	Antimony, Carbon-Disulfide	Yes	$7x10^{-4}$	Beryllium, 1,1-DCE	Yes
	Soil	1	None	No	$3x10^{-8}$	None	No

The grassy area contains mainly Bahia grass and some hydrophytic vegetation, including reed grass, maidencane, sedges, rushes and mild water pepper. The wetland areas of the southern half contain such species as black willow, water oak, southern bayberry and cattail. The other large wetland area in the southeastern section of the Site contains the largest and most mature trees on the Site. Trees in this area include slash pine, water oak, laurel oak and black oak.

The fauna on and around the Site observed during the RI/FS include, but are not limited to, mammals such as the white-tailed deer, raccoon, gray fox, gray squirrel and eastern cottontail rabbit; birds such as the common crow, mourning dove, bobwhite quail, turkey vulture, killdeer, cattle egret, blue jay and marking bird; reptiles such as the gopher tortise; amphibians such as the green frog; and pond macroinvertebrates such as water boatmen, water striders and dragonflies. Faunal observations at the Site included visual observations of the animal, or any signs of the animal such as tracks, nests or song.

In general, adverse impacts to aquatic, avian and mammalian environmental receptors are unlikely. Surface water and sediment chemical concentrations are generally below comparison values and concentrations of chemicals in soils were unlikely to pose a significant food chain impact under current Site conditions. Although some isolated elevated concentrations of zinc and chromium were detected in sediments, the lack of sustained bodies of water and, therefore, the lack of widespread aquatic receptors suggests that the impact of these concentrations is likely to be limited.

7.0 DESCRIPTION OF CLEANUP ALTERNATIVES

The cleanup alternatives considered for both soil and groundwater in the Feasibility Study (FS) are discussed below, and the criteria EPA uses to evaluate the options are discussed in Section 8.

7.1 Alternatives for Groundwater Remediation

Groundwater Alternative A: No Action

In this groundwater alternative, no further cleanup action would be taken. EPA is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to use this option as the baseline against which others are compared. This alternative is not protective of the groundwater and will not achieve ARARs. There would be no cost for this alternative.

Groundwater Alternative B: Institutional Controls

Alterative B would consist of institutional controls, such as deed restrictions or well drilling bans, in combination with groundwater monitoring. This alternative would reduce any potential health risks associated with contaminated groundwater. Deed restrictions would be placed on the contaminated area to prohibit the installation of new water supply wells. The potential for cross-contaminating of the lower groundwater zones and increasing the hydraulic gradient would be prevented by prohibiting the installation of new wells. This alternative would provide for natural attenuation of contaminants to restore groundwater quality. Groundwater sampling and analysis for identified contaminants of concern would be performed quarterly in the courtyard area and at the boundary of the contaminated area. The results from the groundwater monitoring would be used to determine the effectiveness of natural attenuation as a remedial option and to assess potential contaminant migration. A review of the groundwater data collected at the Site would be evaluated quarterly until contaminant concentrations in the groundwater no longer exceed groundwater cleanup levels for three consecutive sampling events. The total cost to implement this remedy is estimated at $334,500.

Groundwater Alternative C: Institutional Controls/Containment

Groundwater Alternative C would consist of the same controls and monitoring as B with containment. This would involve installing an asphalt cap over portions of the courtyard area and any necessary drainage controls. Drainage controls would provide additional protection from infiltration and damage to the cap. Deed restrictions and groundwater monitoring would be implemented as described for Alterative B to monitor movement and the effectiveness of natural attenuation of groundwater. Groundwater sampling and analysis for identified contaminants of concern would be performed quarterly in the courtyard area and at the boundary of the contaminated area. The results from the groundwater monitoring would be used to determine the effectiveness of natural attenuation and containment as a remedial option and to assess potential contaminant migration. A review of the groundwater data collected at the Site would be evaluated quarterly until contaminant concentrations in the groundwater no longer exceed groundwater cleanup levels for three consecutive sampling events. The estimated cost is $611,500 for this alternative.

Groundwater Alternative D: Controls, Pump & On-site Treatment with Discharge to POTW

This alternative would include the same controls and monitoring as Alterative B in addition to pumping contaminated groundwater and treating it using air stripping on-site. Extraction of groundwater would be accomplished by installing pumps in the courtyard area monitoring wells in which contaminants have been detected above the cleanup levels. The installation of additional wells may be required to adequately extract the contaminated groundwater. The location and number of wells in the manufacturing area depends on the areal extent of contamination, area of influence produced by each well, and the variability in pneumatic permeability around the manufacturing area. Some pilot-scale treatability work would likely be required to complete the design of the air stripping system. The extracted groundwater would be pumped through any necessary solids removal system to remove suspended and/or dissolved solids (including metals) and through the air stripping system to remove VOC's. The treated groundwater would be discharged through the existing sewer system to the local Publicly Owned Treatment Works (POTW) after all discharge requirements are met. Groundwater sampling and analysis for identified contaminants of concern would be performed quarterly in the courtyard area and at the boundary of the contaminated area. The results from the groundwater monitoring would be used to determine the effectiveness of the treatment system as a remedial option and to assess potential contaminant migration. A review of the groundwater data collected at the Site would be evaluated quarterly until contaminant concentrations in the groundwater no longer exceed groundwater cleanup levels for three consecutive years. Groundwater cleanup levels are expected to be achieved within thirty years. The emissions from the air stripping system would meet all State and Federal air quality requirements relating to the treatment system. The estimated cost for this alternative is $1,880,000.

7.2 Alternatives for Soil Remediation

Alternatives for soil which would treat the principal threats posed by the PCB contamination vary by treatment, quantities and characteristics of the residuals and untreated wastes.

Soil Alternative A: No Action

No action would be taken to address PCBs remaining in the soil above 10 mg/kg at no further cost. The NCP requires using "no action" as a basis for comparing active cleanup measures. This alternative would not be protective and would not achieve ARARs.

Soil Alternative B: Institutional Controls

Alternative B would use deed restrictions on the Site for future and present land use as a control to reduce the risks posed by PCBs at the Site. In conjunction with deed restrictions, a security fence would be constructed around the contaminated area to reduce the possibility of ingestion or direct contact with the PCBs. A monitoring well(s) would be installed and sampled to determine if the PCBs were moving to the groundwater. The estimated cost is $82,500.

Soil Alternative C: Controls and Containment

Alterative C would use the same controls and monitoring as B in addition to containment to reduce potential health risks associated with the PCBs in soils. The fencing would reduce the possibility of direct contact with the PCBs. Containment would include the construction of an asphalt cap over the contaminated area. The cap design would include drainage controls at an estimated cost of $123,200.

Soil Alternative D: Excavation/Off-Site Disposal

Soil Alternative D would include excavation of the contaminated soil above 10 ppm and transportation to an off-site Toxic Substances Control Act (TSCA)-permitted landfill. Excavation would be done by conventional construction equipment and loaded into a lined, covered roll-off containers or dump trucks. The excavated area would be backfilled with clean fill material. Total cost is estimated at $56,200.

Soil Alternative E: Solvent Extraction/On-Site Disposal of Treated Soil/Off-Site Disposal of PCBs

This alternative would involve excavation, treatment, and on-site disposal of the treated soil. A solvent extraction process would be used to treat the contaminated soils on-site. This treatment involves removing PCBs from the excavated soil. Extracting the PCBs may require more than one stage to reduce PCB concentrations in the soil to less than 2 mg/kg so they will be acceptable for on-site disposal with no additional controls. Recovered PCBs would be placed in appropriate containers and shipped off-site for disposal at a TSCA-permitted facility. The estimated cost is $214,800 for this alternative.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A detailed comparative analysis was performed on the five soil alternatives and four groundwater alternatives during the FS using the nine evaluation criteria set forth in the NCP. The advantages and disadvantages were compared to identify the alternative with the best balance among these nine criteria.

The NCP categorizes the none criteria into three groups:

(1) Threshold Criteria - overall protection of human health and the environment and compliance with ARARs (or invoking a waiver) are the threshold criteria that must be satisfied in order for an alternative to be eligible for selection;

(2) Primary Balancing Criteria - long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability and cost are primary balancing factors used to weigh major trade-offs among alternative hazardous waste management strategies; and

(3) Modifying Criteria - state and community acceptance are modifying criteria that are formally taken into account after public comment is received on the proposed plan and incorporated in the ROD.

The selected alternative must meet the threshold criteria and comply with all ARARs or be granted a waiver for compliance with ARARs. Any alternative that does not satisfy both of these requirements is not eligible for selection. The Primary Balancing Criteria are the technical criteria upon which the detailed analysis is primarily based. The final two criteria, known as Modifying Criteria, assess the public's and the state agency's acceptance of the alternative. Based on these final two criteria, EPA may modify aspects of a specific alternative.

The following analysis is a summary of evaluation of alternatives for remediating the contamination found at the Firestone Site under each of the criteria. A comparison is made between each of the alternatives for achievement of a specific criterion.

THRESHOLD CRITERIA

8.1 Overall Protection of Human Health & Environment addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls. Criteria used to evaluate the protectiveness of an alternative included the following: (1) no cancer risks from exposure to groundwater with concentrations that exceed MCLs; (2) no significant risks of threshold toxic effect (HI less than 1); and (3) no significant risk or adverse impact on the environment.

Groundwater Alternative A would not protect human health or the environment from the potential risks posed by the groundwater contamination at the Site. Alternatives B and C would provide protection to human health by reducing the potential for ingesting groundwater through deed restrictions. In addition, C would reduce movement of contaminants into the deeper aquifer which is a water supply source. Groundwater extraction in D would provide additional protection through treatment of groundwater to remove the contamination.

Since Groundwater Alternative A does not eliminate, reduce or control any of the exposure pathways, it is therefore not protective of human health or the environment and will not be considered further in this analysis.

Soil Alternative A would not protect human health or the environment from risks posed by the PCBs in the soil or meet cleanup levels. Alternatives B and C would provide some protection by reducing the potential for direct contact with contaminants. The cap under Alternative C would provide additional protection for the environment by reducing the penetration of water through the source area. This would reduce the potential for contaminants to move into the groundwater. A long-term risk would exist under C because the contaminants would be contained rather than destroyed. Alternatives D and E would provide the most protection for human health and the environment by removing contaminants from the Site. Solvent extraction would treat the contaminated soils in E. Alternatives D and E would meet cleanup levels.

Since Soil Alternative A does not eliminate, reduce or control any of the exposure pathways, it is therefore not protective of human health or the environment and will not be considered further in this analysis.

8.2 Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental and/or provide grounds for a waiver. The identified ARARs for this Site are listed in Section 10.2.

Groundwater Alternative A would not provide a way to evaluate compliance with the chemical-specific cleanup requirements. Action-specific requirements would not be applicable to A because no cleanup action would be taken. Alternatives B, C and D would comply with health and environmental requirements. There are no location specific requirements applicable to the Site.

The 10 mg/kg TSCA action level is appropriate as a PCB cleanup level for Site soils. No location-specific requirements are appropriate to this Site. Soil Alternative A would not meet any standards because no action would be taken. Alternative B, Controls, would not meet any requirements because no active measures would be included. Alternatives C, D and E would comply with all federal and state action-specific requirements.

Since Soil Alternative B would not comply with the TSCA action level, it will not be considered further in this analysis.

PRIMARY BALANCING CRITERIA

8.3 Long-term Effectiveness and Permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been achieved. This criterion includes the consideration of residual risk and adequacy and reliability of controls.

Groundwater Alternative B would provide a means to measure change in contamination and would provide additional protection of human health by restricting future use of the property. Alternative C would provide long-term effectiveness and permanence and would also serve to reduce movement of contaminants through containment. Alterative D would best reduce long-term risk through extraction and treatment of groundwater.

Proper maintenance of the cap in Alternative C should ensure long-term reliability. In addition under this alternative, monitoring would provide a way to measure the effectiveness of the cap. Alternatives D and E would have better long-term effectiveness and permanence because the contamination would be removed from the Site.

8.4 Reduction Toxicity, Mobility or Volume Through Treatment refers to the anticipated performance of the treatment technologies a remedy may employ.

No contaminated groundwater would be treated under Alternatives B or C. Thus, reduction in toxicity mobility or volume would only result through the passive means of natural processes. Alternative C would result in additional reduction in contaminant mobility by preventing rain from penetrating the cap. The toxicity, mobility and volume would be reduced by Alternative D at an accelerated pace by active means.

Soil Alternative C would not reduce toxicity or volume, but would reduce the potential for movement of contaminants to the groundwater. The toxicity, mobility and volume of the contaminants would be effectively reduced in Alternatives D and E by excavating the contaminated soil and treating it either on or off-site. Alterative E would provide the only on-site treatment remedy for the Site.

8.5 Short-Term Effectiveness refers to the period of time needed to complete the remedy and any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy until cleanup levels are achieved.

Groundwater contamination currently exceeds cleanup levels at the boundary of the manufacturing area. Risks during cleanup under Groundwater Alternatives B, C and D would be minimal. Risk to Site workers would be somewhat higher, but this risk would be reduced by compliance with health and safety regulations.

The short-term risk to the public and the environment under Soil Alternatives C, D and E would be minimal. Risks to Site workers would be somewhat greater, but this risk would be reduced by compliance with health and safety regulations.

8.6 Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Groundwater Alternatives B, C and D would be the same with respect to implementability because the technologies, the materials, and services required are readily available for each. The overall effectiveness of these alternatives would be determined by sampling the groundwater at the Site and in addition for D to monitor the treated effluent.

Soil Alternative C would require working with state and local government to establish and enforce the deed restrictions. Capping, as specified under C, is a conventional and widely used method for containing contamination. However, C might be difficult to implement, as it could affect growth of the facility. Alternative D would be relatively easy to implement because excavation is a widely used and proven method for removing contamination. The last alternative would be difficult to implement due to the relatively complex nature of on-site treatment for the small volume of soils to be treated. Treatability studies would be required during design for E to insure that solvent extraction would work effectively.

8.7 Cost - The total costs associated with Alterative B would be lower than Alterative C or D. The total present worth cost of Alternative B is $334,500, and the total present worth of C is $611,500; while the present worth of D is $1,980,000.

Only Alternative C would require operation and maintenance costs after the cleanup was completed. The total cost of Alternative C is estimated at $123,200; D's total cost would be $56,200, and the estimated cost for E would be $214,800.

MODIFYING CRITERIA

8.8 State Acceptance - EPA and GAEPD have cooperated throughout the RI/FS process. The State has participated in the development of the RI/FS through comment on each of the planning and decision documents developed by EPA, and the Proposed Plan and the Draft ROD and through frequent contact between the EPA and the GAEPD Site project managers. GAEPD concurs with EPA on the remedy selection to remediate the contaminated media at the Firestone Site.

8.9 Community Acceptance - Based on comments received during the January 12, 1993 public meeting and the lack of negative comments received during the comment period, it appears that the Albany community generally agrees with the selected remedy.

9.0 THE SELECTED REMEDY

Based upon consideration of the CERCLA requirements, the detailed analysis of the alternatives using the nine criteria, and public comment, EPA has selected Groundwater Alterative D (Pump and Treat) and Soil Alternative D (Off-Site Disposal) to reduce risk at the Firestone Tire and Rubber Site.

This preferred alterative will permanently treat the remaining threats at the Site. It will be fully protective, cost-effective, and attain all Federal and State requirements.

9.1 Performance Standards

(1) Soil Treatment

Soil contaminated with concentrations of PCBs that exceed 10 ppm (approximately 20 cubic yards) shall be excavated and transported to a TSCA permitted landfill. The excavated area will be backfiled with clean fill material.

(2) Groundwater Treatment

Groundwater extraction and treatment system shall be constructed by installing pumps in monitoring wells in which contaminants have been detected above the cleanup levels. The installation of additional wells may be required to adequately extract the contaminated groundwater. The location, type and number of pumps and wells required to extract the contaminated groundwater will be determined during the Remedial Design. The extracted groundwater would be pumped through any necessary solids removal system to remove suspended and/or dissolved solids (including metals) and through the air stripping system to remove VOCs. The treated groundwater would be discharged through the existing sewer system to the local Publicly Owned Treatment Works (POTW) after all discharge requirements are met. If the POTW discharge becomes unavailable, EPA may amend the ROD to allow discharge to surface water. If EPA deems necessary, additional air strippers and/or monitoring wells will be installed as part of the remedial action to ensure compliance with the cleanup levels of the selected remedy.

The groundwater extraction system will continue to operate until cleanup levels for the contaminants of concern are reached throughout the contaminated area.

The Residuum aquifer and the Floridan aquifer (referred to in some of the documents as the Residuum, Transition Zone and upper and lower Ocala aquifers) will be treated until the cleanup levels for the contaminants, as listed below are attained.

Contaminant	Cleanup Level	Type of Regulation
Antimony	6 ug/l	SDWA MCL
Beryllium	4 ug/l	SDWA MCL
Benzene	5 ug/l	SDWA MCL
Carbon Disulfide	56 ug/l	Hazard Index = 1
* Chromium	100 ug/l	SDWA MCL
1,1-DCE	7 ug/l	SWDA MCL
PCBs	0.5 ug/l	SWDA MCL
Lead	15 ug/l	Action Level
1,1,1-TCA	200 ug/l	SDWA MCL

- Cleanup level based on Maximum Contaminant Level (MCL), cancer Risk of increased chance of cancer of 1 case in 1,000,000 people ($1x10^{-6}$), Hazard Index of 1 (dosage not causing adverse effects), or Action Level depending on whether MCLs have been established.

* Contaminant added after the Proposed Plan was issued.

Although Chromium was not included as a contaminant of concern in the Proposed Plan, the information used to include Chromium is a part of the FS and is contained in the

Administrative Record. Chromium was found on-site in the groundwater at concentrations above the MCL (100 ug/l) and therefore EPA is adding it as a contaminant of concern. EPA has determined that this is not a significant change because the original remedy already addresses metals in the groundwater and EPA believes this remedy will also address the Chromium in the groundwater.

This ROD requires sampling and analysis during the remedial design to further define the background groundwater concentrations of the inorganic contaminants. If, based on that information, the background concentration for an inorganic contaminant exceeds the SDWA MCL, EPA will reexamine whether compliance with SDWA MCL continues to be appropriate for the inorganic contaminants. The true background for inorganics at this Site will be determined by collecting additional groundwater samples for at least the first year of the RD, from the original background sampling locations using a peristaltic pump operating at a low flow rate. This procedure will be incorporated into the quarterly sampling activities which are currently ongoing. The operation of the peristaltic pump may become ineffective at depths below 20 ft. If this situation occurs, the groundwater samples will be collected in accordance with the Region IV Standard Operating Procedures and Quality Assurance Manual used during the RI/FS activities If EPA deems it necessary, additional wells will be installed off-site to determine if the elevated concentrations of the inorganic contaminants of concern are a result of past facility activities.

The selected remedy will include groundwater extraction and treatment until established cleanup levels are achieved. During the operation of the treatment system, performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. The operating system may include:

a) discontinuing operation of extraction wells in areas where cleanup levels have been attained;

b) alternating pumping at wells to eliminate stagnation points; and

c) pulse pumping to allow aquifer equilibration and to encourage adsorbed contaminants to partition into groundwater.

To ensure that cleanup levels continue to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of at least every 5 years following the discontinuation of groundwater extraction.

All extracted groundwater shall be treated to levels which allow for discharge to a POTW.

All air emissions from the air stripper(s) shall be in compliance with Federal and State CAA standards. The method of control of off-gas emissions, if determined necessary during RD, will be included in the RD Report(s).

(3) Institutional Controls

Institutional controls will be placed on well construction and use in the contaminated area. No well will be located, constructed or operated which results in the diminution of the extraction wells at the Site or in the degradation of the contaminated aquifers. Institutional controls will also restrict the use of groundwater containing or potentially containing levels of contamination in excess of MCLs by prohibiting the use of on-site groundwater in any manner resulting in human ingestion or contact. The well restrictions and groundwater controls shall remain in effect until EPA determines that the cleanup levels have been attained. Institutional controls shall also include deed restrictions and record notices placed in the chain of title for the Site in accordance with State law.

10.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility or hazardous wastes as their principal element. The following sections discuss how the remedy meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedy protects human and the environment by excavating the soil contaminated with PCB concentrations that exceed 10 ppm and transporting the material to a TSCA permitted landfill; groundwater extraction and treatment via air stripping; and institutional controls. The selected remedy provides protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, and/or engineering controls.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements

Remedial actions performed under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the Firestone Site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy was found to meet or exceed the following ARARs.

Chemical-Specific ARARs:

Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) (42 U.S.C. § 1412 (§ 300g-1); 40 C.F.R. 141.61 and 141.80) have been set as enforceable standards for public drinking water systems. These standards are relevant and appropriate to the groundwater remediation at the Site.

Clean Water Act (CWA) Federal Water Quality Criteria (33 U.S.C. § 1314(a)(1)(§ 304(a)(1)) are effluent limitations that must meet Best Available Technology(BAT). These standards may be relevant and appropriate to the discharge of water at the Site.

Discharges to Publicly Owned Treatments Works (POTWs) are subject to the requirements of section 307 of the Clean Water Act. These requirements may be applicable to discharge of the treated groundwater.

Clean Air Act (CAA) National Ambient Air Quality Standards (42 U.S.C. § 7409 (§ 109); 40 C.F.R. Part 50) establishes emissions standards, monitoring and testing requirements, and reporting requirements for eight pollutants in air emissions. These standard may be applicable to the operation of the air stripper at this Site.

Toxic Substances Control Act (TSCA) 15 U.S.C. § 2601; (40 C.F.R. Part 761.120 to 761.135) authorizes EPA to establish regulations to control selected chemical substances or mixtures that pose an imminent hazard.

Location-Specific ARARs

CAA National Ambient Air Quality Standards (42 U.S.C. § 7409 (§109); 40C.F.R. Part 50) establishes emission standards to protect public health and public welfare. The standards are national limitations on ambient air intended to protect health and welfare. The standards may be applicable for the operation of the air stripper at the Site.

Georgia Water Quality Control Act (Code of Georgia, Title 12, Chapter 5) oversees the quality and quantity of the state's water resources. Authorizes the Georgia EPD to establish water quality standards and issue discharge permits and is applicable to the discharge of the treated groundwater.

Georgia Hazardous Waste Management Act (Code of Georgia, Title 12 Chapter 8, Article 3, including Georgia Rules for Hazardous Waste Management, 391-3-11-.01,.02,.03,.07,.08,.12,.13,.16) which establishes standards applicable to generators of hazardous waste in the State of Georgia. These regulations may be applicable if residuals from the air stripper contain concentrations of hazardous waste at levels to be considered a generator.

Georgia Air Quality Act (Code of Georgia, Title 12, Chapter 9, including Georgia Rules for Air Quality Control, 391-3-1-.02(3)(ii)) which allows more stringent emission limitations of other requirements if deemed necessary to safeguard the public health, safety or welfare of the people of the State of Georgia. The requirements are applicable to the remedial activities to be conducted at the Site.

Action-Specific ARARs

CWA Discharge Limitations (33 U.S.C. § 1311 (§ 301); 40 C.F.R. Parts 122, 125, 129, 133, 136 and 403) prohibits unpermitted discharge of any pollutant or combination of pollutants or combinations of pollutants to waters of the U.S. from any point source. Standards and limitations are established for and are applicable to the discharges of treated groundwater to a POTW and direct discharge to surface water.

CAA National Emission Standards for Hazardous Air Pollutants (42 U.S.C. § 7412 (§ 112); 40 C.F.R. Part 61) establishes emissions standards, monitoring and testing requirements, and reporting requirements for pollutants in air emissions. These standards are applicable for the operation of the air stripper at the Site.

To Be Considered Materials (TBCs)

EPA Groundwater Protection Strategy (EPA, 1984) is a policy to restore groundwater to its beneficial uses within a time frame that is reasonable.

56 FR, June 7, 1991 - MCLGs & NPDWRs for Lead & Copper [Action levels established for lead (0.015 ppm) and copper (1.3 ppm)] in groundwater.

City of Albany Sewer Ordinance establishes standards for discharge in the sewer system. Any discharge of the treated groundwater to the local sewer system must comply with these ordinances.

10.3 Cost Effectiveness

The selected remedy, Soil Alternative D and Groundwater Alternative D were chosen because they provide the best balance among criteria used to evaluate the alternatives considered in the Detailed Analysis. These alternatives were found to achieve both adequate protection of human health and the environment and to meet the statutory requirements of Section 121 of CERCLA. The present worth cost of Soil Alternative D and Groundwater Alternative D are $56,200 and $1,980,000 respectively and appears to be reasonable.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA and GAEPD have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final ROD at the Firestone Tire and Rubber Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and GAEPD have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume achieved through treatment, short-term effectiveness, implementability, cost, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

The selected remedy treats the principal threats posed by groundwater and removes the principal threats posed by soils, achieving significant contaminant reductions. This remedy provides the most cost effective treatment of any of the alternatives considered. The selection of excavation and off-Site disposal for the small volume of contaminated soils and extraction and treatment of contaminated groundwater is consistent with program expectations that highly toxic and mobile wastes are a priority for treatment to ensure the long-term effectiveness of a remedy.

10.5 Preference for Treatment as a Principal Element

By treating the contaminated groundwater by air stripping, the selected remedy addresses the principal threats posed by the Site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

APPENDIX A

Responsiveness Summary

Firestone Tire and Rubber Company Site

Albany, Dougherty County, Georgia

RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) established a public comment period from December 30, 1992 to January 29, 1993 for interested parties to comment on EPA's Proposed Plan (PP) for the Firestone Site. The comment period included a public meeting on January 12, 1993, conducted by EPA and the Georgia Environmental Protection Division held at the Albany City Hall. The meeting presented the results of the studies undertaken and the preferred remedial alternative for remediation of the contaminated media at the Site.

A responsiveness summary is required by CERCLA (Superfund) Section 117 and it is policy to provide a summary of significant public comments and concerns about the Site, as raised during the public comment period and the public meeting, and the Agency's responses to those concerns. All comments summarized in this document have been factored into the remedy selection process for cleanup of the Site.

This responsiveness summary for the Firestone Site is divided into the following sections:

I. <u>Overview</u>: This section discusses the recommended alternative for remedial action and the public's reaction to this alternative.

II. <u>Background on Community Involvement and Concerns</u>: This section provides a brief history of community interest and concerns regarding the Firestone Site.

III. <u>Summary of Major Questions and Comments Received During the Public Comment Period and EPA's and GAEPD's Responses</u>: This section presents the written comments submitted during the comment period and provides EPA's responses to these comments.

IV. <u>Remaining Concerns</u>: This section discusses community concerns that EPA should be aware of in design and implementation of the remedial alternative for the Site.

I. Overview

The preferred remedial alternative was presented to the public in a fact sheet released December 30, 1992. The recommended alternatives address the remaining source of contamination by excavation and off-site disposal of PCB contaminated soils and extraction and treatment of the contaminated groundwater in the residuum and upper ocala aquifers of the manufacturing area.

The major components of the selected remedy include:

Excavation of PCB-contaminated soils until established cleanup levels are reached with disposal in an off-site permitted landfill.

Backfilling the excavated areas with clean fill material.

Extraction and treatment of contaminated groundwater using existing wells and supplemental wells if necessary. The contaminated groundwater will be remediated using on-site air stripping.

Extracted groundwater after treatment would be discharged to the Local Waste Water Treatment System (Publicly Owned Treatment Works - POTW). All extracted groundwater shall be treated to levels which allow for surface water discharge as a contingency, should POTW discharge become unavailable.

Periodic groundwater monitoring will be conducted to assess the effectiveness of the remedy for a period up to 30 years.

Institutional controls will be placed on well construction and water use on the Site.

II. Background on Community Involvement and Concern

Public participation requirements in CERCLA Section 117 were met in the remedy selection process. The Community Relations Plan was finalized in 1991 for the Firestone Tire and Rubber Superfund Site. This document list contacts and interested parties throughout the government and the local community. The plan also establishes communication pathways to assure timely dissemination of pertinent information.

On August 1, 1991, EPA held a public information session to announce the start of the Firestone Site RI/FS. The RI/FS Workplan, Risk Assessment, Technical Memorandums, RI/FS Reports and any other documents EPA used to prepare a preferred remedy were released to the public on December 30, 1992. The documents were made available to the public in both the administrative record docket and the information repository maintained at the EPA docket room at Region IV Headquarters in Atlanta, Georgia and at the Dougherty Public Library, 300 Pine Avenue in Albany, Georgia. A public comment period was held from December 30, 1992 to January 29, 1993.

Notices were placed in the Albany Herald newspaper on December 28, 1992, January 5 and 11, 1993 announcing the comment period. In addition to the public comment period and the administrative record files, a public meeting was held on January 12, 1993 at the Albany City Hall. At this meeting representatives from EPA and Georgia Environmental Protection Division answered questions and addressed community concerns.

III

Summary of Major Questions and Comments Received During the Public Comment Period and EPA's or GAEPD's Responses

The following is a summary of the written comments received during the comment period for the Proposed Plan addressing the contamination found at the Firestone Site and EPA's response to each.

Comment:

1. Cooper Tire indicated that the Proposed Plan states that the four above-ground fuel oil storage tanks remaining on the Site are currently used by Cooper. Cooper Tire informed EPA that the tanks are not being used nor have they ever been used by Cooper Tire. The future of the tanks have not been determined.

Response:

EPA has considered the comment and will modify future documents to indicate that the storage tanks are not currently being used by Cooper Tire.

Comment:

2. Bridgestone/Firestone Inc. indicated that the summary of the Remedial Investigation findings has not adequately reflected all of the data from the Site. It is Bridgestone/ Firestone's position that metals are present in groundwater at concentrations that are representative of background concentrations.

Response:

EPA previously agreed to allow Firestone to resample wells where inorganics exceed MCLs or proposed MCLs. This information was provided to EPA as an addendum to the RI

Report and the results incorporated into the Feasibility Study Report.

At this time it has still not been determined, to EPA's satisfaction, that the concentrations of metals in the groundwater at the Site are representative of background concentrations. As a result, in this ROD, EPA is specifying the method to be used in collecting groundwater samples to be analyzed for metals at the Site. If based on this additional sampling, it appears that metal concentrations in the groundwater are representative of background concentrations, EPA will at that time reevaluate the cleanup levels in the ROD.

Comment:

3. Bridgestone/Firestone requested that EPA define two scenarios to conclude groundwater remediation activity. In scenario #1 remediation would conclude when three consecutive quarterly sampling events indicate that the concentrations of the contaminants of concern are below the MCLs. Scenario #2 assumes that MCLs are not achievable and a contaminant concentration curve would reach an asymptotic limit above the desired MCL. The concentration curve would be established based on a minimum of two years monitoring at a quarterly frequency. Treatment of groundwater would be terminated after the bottom of the curve has been established with three consecutive sampling events.

Response:

Scenario #1 - EPA will consider the remediation complete when groundwater monitoring demonstrates that all MCLs have been achieved for three consecutive years.
Scenario #2 - At this time, EPA has no reason to believe that MCLs will not be achieved by installing the pump and treatment system. If EPA determines that the system is not adequately reducing the concentrations of the contaminants of concern, the remedy will be reevaluated.

RESPONSES TO PUBLIC CONCERNS RECEIVED DURING THE PUBLIC MEETING

Comment:

1. A commenter asked if EPA would try to clean up the groundwater in less than 30 years if it was possible.

Response:

EPA indicated that all remediation would be completed in the most efficient and cost-effective manner. Thirty years is only a standard time estimate used for costing purposes. The actual time to remediate the groundwater could take more or less than thirty years. The actual time to remediate the groundwater will be better defined during the remedial design.

Comment:

2. A concerned citizen asked if all of the information EPA uses to make remedy selection decisions is located in the repository.

Response:

EPA indicated that all information used to make remedy selections are contained in the Administrative Record which is available in the local information repository.

Comment:

3. A concerned citizen asked if EPA had any intentions of cleaning up Arnold's Lake?

Response:

Based on the result of the data from the RI, the concentrations of the contaminants present in the Arnold's Lake area do not exceed any unacceptable health risk or MCL; and, therefore, cleanup for this area is not required.

Comment:

4. A commenter asked how many wells would be required to extract the contaminated groundwater.

Response:

During the Remedial Design the number, size and location of the extraction wells to be installed will be determined.

Comment:

5. A commenter asked how far would the extraction wells extend into the aquifers.

Response:

EPA will ensure that the extraction system will capture and extract all contamination of concern that exceed MCLs and background levels. This will be determined during the Remedial Design.

Comment:

6. A commenter that lives north (upgradient) of the Site asked if she should be as concerned about contaminated groundwater as the citizens south (downgradient) of the Site.

Response:

All citizens should be concerned to make sure things are done properly. However, based on the sample results of the RI, the contaminated groundwater is primarily contained in the manufacturing area and should cause no adverse effect on residents north or south of the Site. EPA will continue to monitor the area and will take the necessary actions to ensure that the safety of the water supply is maintained. If the contamination spreads beyond the Facility boundaries the public will be notified.

Comment:

7. A concerned citizen asked if it was the residents responsibility or EPA's responsibility to sample the private well.

Response:

At the present time EPA has no reason to believe that contamination from the Firestone Site has migrated beyond Site boundaries. Therefore, it would be the resident's responsibility to have their private well tested if residents so desired. EPA understands that Albany Water, Gas and Light intends to sample one well north and south of the Site and present the results from the sampling activity to the community.

Comment:

8. A commenter asked how often groundwater monitoring would occur?

Response:

The details of groundwater monitoring will be decided during the remedial design. However, at a minimum groundwater will be collected and analyzed semi-annually.

Comment:

9. A commenter asked who will pay for the cost of this cleanup?

Response:

EPA will offer Bridgestone/Firestone an opportunity to conduct the design and the cleanup at the Site. If Bridgestone/Firestone will not do so, EPA will perform the cleanup and seek to recover cost from Bridgestone/Firestone.

IV. Remaining Concerns:

The primary remaining community relations concern will be to keep the community informed on the status of Site remediation. EPA will inform the local citizens if any significant modifications are made to this remedy.